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3d Session. } { No. 160.

U. S. DEPARTMENT OF AGRICULTURE.

Report No. 80.

PROGRESS

OF THE

BEET-SUGAR INDUSTRY

IN

THE UNITED STATES

IN

1904.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1905.

[Concurrent Resolution of March 2, 1905.]

Resolved by the Senate (the House of Representatives concurring), That there be printed twelve thousand copies of the Report on the Progress of the Beet-Sugar Industry in the United States in nineteen hundred and four; one thousand copies for the use of the Senate, three thousand copies for the use of the House of Representatives, and eight thousand copies for the use of the Department of Agriculture.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A REPORT ON THE PROGRESS OF THE BEET-SUGAR INDUSTRY IN THE UNITED STATES IN 1904.

FEBRUARY 15, 1905.—Read; referred to the Committee on Agriculture and Forestry, and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith for the information of the Congress a report on the Progress of the Beet-Sugar Industry in the United States in 1904. Your attention is respectfully invited to the accompanying letter of the Secretary of Agriculture, recommending that 10,000 copies of the report be printed for the use of the Department of Agriculture in addition to such number as may be desired for the use of the Senate and House of Representatives.

THEODORE ROOSEVELT.

THE WHITE HOUSE, *February 15, 1905.*

LETTER OF TRANSMITTAL.

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 11, 1905.

MR. PRESIDENT: I have the honor to transmit herewith for your information and that of the Congress of the United States a report entitled "Progress of the Beet-Sugar Industry in the United States during the year 1904," prepared by Mr. Charles F. Saylor, special agent of this Department.

In view of the popular interest in the industry mentioned, I respectfully recommend that at least 10,000 copies of the report be printed for the use of this Department in addition to the number which Congress may in its wisdom order for the use of the members thereof.

I have the honor to remain, Mr. President,

Very respectfully,

JAMES WILSON, *Secretary.*

The PRESIDENT,
The White House.

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PROGRESS OF THE BEET-SUGAR INDUSTRY IN THE UNITED STATES IN 1904.

REPORT OF SPECIAL AGENT,

CHARLES F. SAYLOR.

LETTER OF SUBMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SPECIAL AGENT,
Washington, D. C., February 9, 1905.

SIR: I submit herewith for your inspection and approval the manuscript of my report on the Progress of the Beet-Sugar Industry in the United States in 1904. It includes a general review of the successes and failures of the year and a discussion of the influences and conditions that are operating favorably and unfavorably on the development of the industry. The present conditions in all the beet-producing States and the prospects for new factories are reviewed at some length.

Respectfully,

CHAS. F. SAYLOR, *Special Agent.*

Hon. JAMES WILSON,
Secretary of Agriculture.

INTRODUCTION.

This report on the Progress of the Beet-Sugar Industry for 1904 is the eighth annual report prepared and submitted by the author on the subject.

Like all new enterprises, the sugar industry as it stands to-day is necessarily the product of the conditions involved in its environment and history. Many of these conditions were unforeseen and unanticipated. It seemed reasonable eight years ago that a nation so progressive as ours, so essentially agricultural in its resources, so cosmopolitan in its markets and demands, should exert itself to the limit of its abilities in supplying its own needs. Eight years ago the beet-sugar industry was so slightly developed and so restricted in territory as to give only a hint of its possibilities. Our past achievements in well-established lines of agriculture, our broad expanse of agricultural land with a great variety of soils and climatic conditions, and our great and rapid industrial development strongly suggested the possibility of establishing a great beet-sugar industry. We were practically supplying home demands and selling to other countries a large supply of dressed meats, live stock, poultry, eggs, cotton, grain, flour, and other products of the farm; and our agricultural exports were constantly increasing. The farm was a most important factor in the balance of trade in our favor with other nations of the earth. It seemed illogical that we should be buying abroad at that time $100,000,000 worth of a product that was so purely agricultural in its nature as sugar.

The beet-sugar industry appealed to intelligent agriculturists as one which would promote rotation of crops, increase the fertility of our soils, and give us a better balanced production of live stock, grain, forage, and root crops. To thoughtful business men the importation of such a large item of one of the necessaries of life indicated a failure to realize and utilize our natural advantages. These facts attracted popular attention and aroused the interest and ambition of our people to attempt the establishment of the sugar-producing industry. The press, the people, and the State and National governments joined in an agitation that soon reached the proportions of a crusade in behalf of this industry.

In the work of development which has been done during the last eight years it would be surprising if some mistakes were not made. The agitation was based on logical principles, the general anticipations were rightly founded, and in the main the results justify the efforts which have been put forth. Ambitions and hopes can be realized only through efforts made in harmony with actual conditions. It was impossible to mark out the path of development or foresee the obstacles to be encountered and the difficulties to be overcome in launching such an industry. In looking back we realize that no one appreciated the real difficulties surrounding the beet-sugar industry. No one can study them and become sensible of the importance this industry has assumed and not decide that the demand for home production to the extent of home consumption was and is logical. As to exportation of this product it is a question that can be safely left to the future development of our resources, conditions, and markets.

The past season can be fairly rated throughout the different portions of the United States as favorable to the production of sugar. The success attending the beet crop is offering much encouragement and considerably improving the prospects of sugar production next year. The shortages of beets grown last season were not due to a failure of the yield either in respect to quantity or quality, but to the limited acreage secured by factories in many localities. Many things tended to favor the sugar industry the past year. The season was quite favorable throughout the country. There has been a tendency toward steady and good prices for sugar; the beets have shown an unusually high sugar content; European production has been considerably diminished, and the indications are that it will continue to contract. There has been a steadier home demand and a larger consumption of sugar this year than during any other except one in our history. Decrease of foreign production and steady increase of home consumption are two factors that appear likely to operate steadily for some time to come, and these are the factors that largely govern the price of our home product.

There were four factories installed and put in operation during the past season. As is usual with factories recently built, they are of large capacity. Three of them slice 600 tons of beets each per day, and one of them 1,200, making a total of 3,000 tons per day of additional capacity installed during the past year. It is interesting to note that two of these factories were installed in Wisconsin, where beets are grown without irrigation, and two of them in Idaho, where irrigation is practiced.

There are some features of the development of the beet-sugar industry that deserve mention in this introductory summary.

There has been more progress made in the sale and use of by-products during the past season than in any previous year. Often in former reports I have pointed out the influence which the sugar industry exerts on the stock-feeding interests. It is to be noted that farmers everywhere are becoming more appreciative of the feeding value of the two by-products, pulp and molasses. Stock interests are rapidly increasing in factory districts, owing to the feeding of pulp, and the farmers are more generally using it.

We now have twelve States interested in the production of beet sugar, in four of which irrigation is practiced and in eight of which rainfall alone supplies the moisture for the growth of crops. However, it must be noted that, as a rule, the irrigation States are the ones which are establishing not only the larger number of factories but the largest in size. Throughout these twelve States, scattered as they are from the Atlantic to the Pacific, are brought into use many different soils, conditions, and resources. We are growing sugar beets through artesian systems of irrigation and by irrigation from running streams and storage systems, partly by irrigation and partly by rainfall, and wholly by irrigation. We are growing sugar beets without irrigation in States where the moisture is hardly sufficient and in States where it is more than abundant. We are growing them in heavy clay loam, in sandy loam, in clay soils, and in silt soils. We are growing them in the river valleys, on the uplands, and on steppes of the mountains.

Through all this experience under different climatic conditions, with varied soils and resources of every description, we are receiving information that is most useful in the future development of this industry. The industry is, in fact, constantly acquiring more settled and definite status. Any new factory installed now is founded upon conditions which have been investigated and are known to be satisfactory.

There is apparently a better understanding of and a well-grounded confidence in the conditions affecting this industry. Capital appears better able to grasp the possibilities of investment, to look beyond the pioneer experiences incident to every new sugar factory, to better comprehend the general advantages which can only be fully enjoyed when all conditions are thoroughly developed. The few failures which have occurred, through mistakes in locating or constructing or capitalizing concerns, while they are serious matters affecting the investors involved, are proving valuable guides to those interested in future extension of the industry.

The number of factories in the United States in 1904 was as follows:

Number operating	48
Completed plants not operating	6
Building and partially completed	3
Slicing stations	4

Those operating are distributed as follows:

California	5	Ohio	1
Colorado	9	Oregon	1
Idaho	3	Utah	4
Michigan	16	Washington	1
Minnesota	1	Wisconsin	3
Nebraska	3		
New York	1	Total	48

Of those not operating, California has 3, located at Chino, Crockett, and Watsonville; Michigan has 3, located at Rochester, Bay City, and Carrollton. Of the slicing stations, Utah has 3 connected with the Lehi plant; Idaho has 1 connected with the plant at Sugar City.

Of the 3 factories building during the year and but partially completed, Michigan has 2, located at Charlevoix and Mount Pleasant, and Arizona has 1, located at Glendale, near Phoenix.

At first glance the idle factories might appear a little discouraging, but it is safe to say that the percentage of idle plants in the United States is not nearly as heavy as the yearly average for the past ten years in Germany, France, and other beet-sugar countries. The idleness of some of these plants has resulted from temporary causes. About half of them are idle from causes which at present seem permanent; but these may become active producers under more favorable conditions. In some cases negotiations are under way having in view the moving of idle plants to locations more suitable for the industry.

In fact, one of the plants erected this year, which has every prospect for a successful future, was removed from a location where obstacles seemed insurmountable. Another factory in the West, which had a disastrous career and finally closed down for a couple of years, reopened with a good supply of beets during the last campaign, was quite successful, and bids fair to continue active in sugar production. The reaction on local sentiment which resulted from its closing brought about the favorable conditions necessary to its success. In this case it was purely a matter of securing a sufficient supply of beets.

This was the main question involved in the closing of other factories which are now idle. Where sufficient beets can be secured, nearly every other difficulty can be overcome. To a locality where the farmers are willing to grow a supply of beets capital and labor are at once attracted. In the case of this Western factory, which remained idle for two years, its advantages became apparent to the community through their loss. Every interest connected with the factory during its period of rest had an opportunity to study the causes contributing to its failure. The factory was reorganized, and those interested united their forces and planned to avoid the difficulties. As a result, the work of the factory and the farmers was much more satisfactory and remunerative. It is safe to predict that half of the idle plants will gradually, in some way, work back into active operation.

The difficulty with most of the factories which have not succeeded was too great haste in their establishment and building factories in too close proximity before conditions had sufficiently developed for them to secure a supply of beets. The success attending beet growing this year has brought about a marked change in the facility with which the factories operating in the same districts are now securing additional acreage for next year's campaign. Most of them will have procured sufficient acreage by January 1, 1905, to meet the requirements of a full campaign. Around these active factories, as compared with other years, there is a marked change in the willingness of the farmers to grow beets. It appears certain that another campaign will see some of these idle plants in operation, and by 1906 possibly all of them.

MISTAKES MADE AND OBSTACLES MET AND OVERCOME.

All persons and organizations interested in the development of the beet-sugar industry, including the Department of Agriculture, have reason to congratulate themselves on the results attained up to the present time. The future prospects of the industry seem most auspicious.

A brief account of the mistakes which have been made and the obstacles which have been met and overcome ought to be of interest at this time.

THE SUPPLY AND CHARACTER OF LABOR FOR THE BEET FIELDS.

While eight years is not a very long period in the experience of men or the affairs of a nation, it is sufficient to give us a large fund of information regarding the manufacture of beet sugar. Eight years ago a boy 9 years old on a farm may have had his first experience in weeding and thinning beets. To-day such a boy is 17 years old and thoroughly equipped with all the information necessary to the practice of growing sugar beets. To-day there are thousands of boys who have developed in this way. What has been said of the boy is equally true of his elders. The one great thing lacking at first was information on the subject. This is true of those connected with factories, as well as those working on the farm. Lack of information regarding the best methods of farm and factory management has been the cause of most of the difficulties affecting the industry.

Fortunately for the beet-sugar industry its first development was inaugurated in those countries of Europe in which the people were accustomed to hard, laborious work and even drudgery. In those countries with congested populations and high-priced lands agriculture is necessarily intensive. Through a long line of succession from father to son the people were accustomed to the closest economy, and did not shrink from the labor involved in producing the most from the least land. In several such countries sugar beets became a main crop, and the work of their production became intimately interwoven in the daily life and duties of these peoples. The farmers learned to grow sugar beets successfully and they taught the art to their children. An unfavorable season or any mishap to the crop had no tendency to discourage beet production. It was clear to them that the same things happened to other crops. Such conditions were very different from those which prevailed in this country when the establishment of the beet-sugar industry was undertaken.

In this country we are devoted to the production and use of labor-saving machinery. Our tendency has been away from rather than toward hand labor. In those old countries the farmer and every member of his family were workers in the beet fields. Here the farmer and the hired men do the work; the children attend public schools and colleges. Our farmers and hired hands not only do the work on the farm, but as a rule they do it with labor-saving implements, the main point being to eliminate every form of drudgery. Now if there is any one thing required in the beet field it is hard work and plenty of it. Sugar beets are an expensive crop. Given sufficient attention and labor they are highly remunerative under ordinary conditions. If neglected they are just as sure to carry the farmer's bank account the other way. It is plain that to grow sugar beets to any extent a farmer will necessarily have to employ considerable labor during the growing season—much more labor than is customary with other field crops. Starting with the labor conditions prevailing in this country, it must be evident that our farmers were, as a rule, unprepared for the task of growing sugar beets extensively. In many places large fields were planted to beets with insufficient labor to do the work.

A good yield of beets will pay the expense of production and leave the farmer a fair profit. Often expenses were estimated too much by comparison with the cost of producing other crops. Disaster naturally followed in such cases, and the farmer decided not to raise another crop. It is evident that if sugar beets are to be produced in this country it must be done by a system of labor which is in harmony with American ideas, conditions, and aspirations. We could not adopt to any extent the family labor system prevalent in Europe. Our young people must not be deprived of educational advantages.

However, I have pointed out in this, as in several former reports, the practicability of using the children of cities in the beet fields to a considerable extent, without violating any of our ideals. I have also pointed out that there are many sources of supply of labor to supplement the farmer's own work, and that we can rely on the beet crop itself to meet the extra expense involved. But none of these things were appreciated by our pioneer beet farmers.

COMPETITION WITH FAVORED CROPS.

I have spoken of the tendency to grow particular crops in particular areas. In Germany, France, Russia, Switzerland, Italy, and some other European countries this tendency appears strong. Grain growing, potato growing, fruit growing, grape culture, and the other lines of production become localized. The same is true of the United States, but to a less extent and less definitely. As our country grows older and demands and resources become better defined there is a marked tendency toward intensive agriculture directed to the production of particular crops. Producers of a particular crop become wedded to it and are more or less on the offensive and defensive with reference to it. This has made it necessary for the friends of the beet-sugar industry to expend considerable energy in order to induce farmers to take up the new line of production. In rural life the themes of conversation and public interest are limited largely to local affairs, and there is a tendency toward conservatism. Every new undertaking must pass muster in all the public and private meetings of the people. The particular lines of production to which the people in a given community are devoted are more or less remunerative and satisfactory. This must be true or they would not receive such exclusive recognition. In many instances a sugar factory has been located in a community particularly devoted to some special crops. The factory is of a certain capacity, measured in the number of tons of beets required to keep it employed.

It does not propose to begin on a small supply of beets and gradually work up to its full capacity, but wants a full supply the first year. The established lines of production in the locality had a small beginning, and worked up gradually; and they are sure to have their special friends and defenders, who do not propose to change from their specialty till they see the success of the new crop demonstrated. More than likely they will insist on some other person making the demonstration, and after it has been made will still be inclined to question the result. It is enough to say that the jealousies and opposition of these specialty crop producers have been serious obstacles in the way of success in the starting of new beet-sugar factories.

Though supported by the best energies of its owners and the special bounty paid to the beet growers by the State, during the past season the factory at Binghamton, N. Y., gave up the contest and was removed to Blackfoot, Idaho. It could not secure sufficient beets to warrant its continuance in New York. Without the beets it had no mission. It was the victim of too much peppermint, cabbage, broom corn, and other specialties. The farmers who supplied this factory with beets, who stuck to it until they were adepts, remained loyal to its interests although they had had experience in producing the other crops named. The trouble was largely due to the fact that beet growers would not survive the first year's experience—would not continue long enough to really test the merits of sugar beets as a crop. They would go back to the old crops.

The factory at Grand Junction, Colo., with favorable conditions for beet growing in its vicinity, but in a community devoted to fruit growing, had to suspend for a period of two years on account of lack of local sympathy. It took these two years to overcome the local prejudice. But it has done so completely, as the results of last year's work will indicate. I could point out many other instances where this lack of local sympathy, due to interest in other special crops, has been more or less serious.

NEW METHODS ON THE FARM.

Granting that the farmer sought and secured enough laborers, he was still confronted with the necessity of employing new methods in beet culture. He had to learn methods suited to his particular farm and locality, as well as the general principles of soil fertility and culture applicable everywhere. Some farms are in a state of tilth and fertility suited to beet production, some require applications of barnyard manure, and others positively need commercial fertilizers. Some require summer-fallowing and others subsoiling. Many things are required to which the new beet farmer is unaccustomed, although he may be recognized as a successful farmer.

The farmer is naturally conservative. When he adopts sugar-beet growing, his success in other lines is as likely to count against him as in his favor. His experience has convinced him that there is a general similarity in methods of raising other crops. This is liable to make him think he is capable of following his own methods in growing sugar beets, especially since he has never been accustomed to following the directions of anyone.

In growing sugar beets a farmer finds laid before him specific directions for the preparation of the soil, the planting, thinning, and harvesting of the crop, and over him an agricultural expert, representing the factory, who assumes to advise and direct him. Such proceedings are naturally at first galling and exasperating to an independent American. Farmer A says, "What's the use of planting 15 or 20 pounds of seeds to the acre and afterwards thinning out 90 per cent of the plants? The factory simply wants to sell me seed." He cuts down the amount to what he deems necessary and secures a poor stand, probably no more than three-fourths or one-half of a full stand. Again he says, "What is the use of all the deep plowing? I will plow my beet land as I would for planting potatoes. They are both root crops, and why not?" He does so; plants his crop and gets an ill-shaped, sprangly, forked beet, low in sugar and purity. "What is the use of all this harrowing and pulverizing of the soil? It is not necessary for potatoes or corn or any other field crop that I know of. It adds to the expense and is useless." He plants his seed in rough, cloddy ground. Through this error many of the seeds lie in air chambers, where they fail to germinate, and many others which germinate, dry out and die. This again seriously affects the stand of beets. The first cultivations are laborious, the weeds and grass get a start, and Farmer A is not able to overcome them on account of the mechanical condition of the soil. He has a poor stand, a weedy field, a poor crop, and he is chagrined. Finally he lays the whole trouble to the difficulty of growing sugar beets, and declares that he will grow no more.

Many times in many parts of the country, such a man has said to me: "I am considered one of the best farmers in these parts. Now look at that field. If I can't grow beets, what are a lot of these other people going to accomplish?" Now, here is an honest, progressive, energetic, thrifty farmer, who wants to do things right. He is unable to set aside the information he has acquired regarding the growing of other crops during a lifetime, and to approach a new branch of farming with an open mind. His mistake will become evident to him some day. Many of the farmers around the sugar factory in his locality succeed. They renew their contracts. Additional ones appear on the list each succeeding year. By degrees his folly becomes apparent to him and he makes a second trial, with much better results, and continues growing sugar beets. Some day his practical experience will enable him to set experts and written directions at naught.

I do not mean to say that the majority of our best farmers follow the course outlined above, but, taking the country over, there are many who do, and such have contributed not a little to the idleness of some factories. Their influence is as bad as their practice. Their model farming in the neighborhood has caused others to prize their advice and emulate their example. Their influence means much in determining the success or failure of the sugar factory. In the absence of knowledge of his own on the subject of growing beets, had such a farmer applied that of others in the same degree he applied his own to other crops, he naturally would have been successful from the beginning. When he learns to do this he will become a resource of strength to the beet production in his community.

On first thought it would hardly seem fair to charge a farmer with extravagance. Directly, farmers are probably freer from extravagance than most other classes of our people. He is naturally frugal, self-denying, and economical. But after all, economy is a relative term, and often in its application to practical affairs it leads to extravagance. And it is in this sense that farmers may be charged with extravagance in beet growing.

When agitation begins and public sentiment is aroused to the point of securing acreage for a sugar factory, the farmer naturally falls in line with the trend of public sentiment and becomes desirous of helping the cause along. He contracts to grow a certain number of acres of beets. For him to refuse to purchase a sufficient amount of seed is purely a matter of extravagance. It is a waste of land, time, and labor.

In selecting the land he reasons as follows: "I have agreed to grow 5 or 10 acres of sugar beets. Now, I don't know about this crop. The north 40 is good corn ground; I want to put that south 80 in oats and the 10 acres across the creek in potatoes. There is that 7 acres across the slough where the weeds got the best of me last year. It is sandy and more worn-out than the rest; I know what I can do with my good land in these other crops; I am not sure about this beet business anyway. I will try that 7 acres in beets." Now, if one requirement in raising beets is more important than another, it is land of a good quality and in fit condition. Good beet land is the very best land obtainable on the farm. There never was a greater error generally promulgated and popularized than that beets should have sandy soil, especially a worn-out soil, and sandy soils are the lightest and first to become worn-out. There is no crop adapted to a wider range of soils than sugar beets. They do well in sandy loam if fertile, in clay loam and in most clay soils, in black loam, and in the various shadings of all those soils. In sections where rainfall is the source of moisture supply, it will cost at least $30 an acre to grow sugar beets. Where they are irrigated, it will cost at least $40 an acre. This represents too much money to be frittered away on soils naturally giving poor yields. It can be considered nothing but pure extravagance in business methods to attempt the experiment. It will require at least 6¼ tons of beets in the rainfall areas and about 8 tons in the irrigated areas to pay the cost of production to the farmer. He can not reasonably expect more than this on poor land. If he is to grow sugar beets, it should be on land capable of producing a profitable crop; it should be on ground which has been so handled previously as to reduce to a minimum the cost of cultivating sugar beets.

The economical method of growing sugar beets is to do everything required and do it exactly on schedule time. As a rule it is desirable to harrow sugar beets or use the weeder before they come up, and to do the same thing soon after they come up, repeating the operation two or three times when necessary to overcome the weeds. The beets should be cultivated as soon as the farmer can see the row, and thinned at the right time. This matter of thinning is the cause of more annoyance and expense than almost any other feature in the process of cultivation. There is a time when this can be done with the least expense and the least disturbance to the plants left standing. Every day's delay after the proper time of thinning has come adds greatly to the expense of the work and the disturbance of the beets that are to form a crop. If neglected too long, the farmer will probably lose several tons of beets per acre.

To explain how this is often done I will again let the farmer tell his own story: "I have not been able to get into those beets. I want to catch up with my work, cultivating my corn ground first. We have had considerable rain and I am behind. I don't think it will pay me to go out and hire a lot of people to work when I can just as well do it myself a little later on." Now, everything depends on getting sufficient people into the beet field to do this particular work at this particular time. If done on time and in the right way, the expense is all covered by the additional yield, by better beets, and by lessening the work which comes later; and the farmer is more than compensated when he sells his crop.

In the beginning of the industry the cultivation of sugar beets, like many other features of the work, proceeded in a haphazard, shiftless, unmethodical manner. Shallow plowing, slack harrowing, poor seeding, neglect of thinning, and poor beets were the rule. It seems that nothing but experience could eliminate this kind of farming from the sugar-beet fields.

Of course there were a few farmers who from the first gave careful study to every detail, appreciated the necessities, followed the directions, and reaped their reward. Every successful season saw large additions to this class. Pay day was the final test of the methods that paid best, and proper methods became contagious.

Eight years' observation of beet growing throughout the country leads me to offer this advice: If a farmer makes up his mind to grow sugar beets, they should be planted on the best land he possesses; he should invest sufficient money in labor to do all the work required, and at the proper time; and he should do it cheerfully and promptly, or stay out of the beet-growing business.

BAD SEASONS, DISEASES, AND INSECTS.

Unfavorable seasons appearing at critical times have added much to the discouragement of farmers. During the early stages of many of our factories there was a general prevalence of drought, producing poor crops, and lasting for two or three years. This period was followed for two years by excessive precipitation in the States lying in the rain belt. The effect of these bad seasons was the discouragement of beet growers, especially the farmers who were making their first attempts. The excesses of drought and rainfall, however, affected seriously all other crops, and usually in a more marked degree than sugar beets.

With other crops the farmer was accustomed to losses by occasional occurrences of this kind. He had not had the opportunity of producing a good crop of sugar beets under normal conditions. He seemed to lay his misfortunes to the crop itself. It takes time to eradicate the disposition to do this. Farmers have now had the opportunity either to observe or experience both the good and the bad results of beet growing.

Four years ago there was a general prevalence of diseases and insects, which produced great havoc in many districts. The growers were entirely unacquainted with this phase of sugar-beet culture. Considerable public interest was aroused. Much was said and written on the subject at the time. Scientists investigated conditions and studied like occurrences in Europe. Congress appropriated money for investigation and the discovery of remedies for diseases and pests in our beet fields. Many were fully convinced that these had been imported with the seed, that we had introduced evils that would plague us constantly, and that they might actually defeat the efforts to establish the industry in this country. The following year was anxiously awaited for developments in this respect. They have never been repeated to any appreciable extent. We have learned that beets, like any other crop, are subject more or less to evils of their own, but not to any greater extent than other crops. Nothing has attacked sugar beets with results at all comparable with the ravages of the chinch bug, the Hessian fly, the cotton boll weevil, or the grasshopper, to which other crops are subject; but it takes time to enlighten the people on a subject of this kind, and there can be no question that the unexpected attacks of insects and diseases in 1900 contributed very largely to the discouragement of farmers.

WASTE OF BY-PRODUCTS.

The first sugar factories went into districts not especially developed in stock production, especially in the intensive features of animal husbandry. Dairying, stock breeding, stock feeding, and creamery production were largely confined to the older States of the East and Middle West which were better developed agriculturally. Had the beet industry developed chiefly in these older and more highly developed communities, the factories would undoubtedly have found an immediate demand for their entire output of by-products. This is illustrated by the experience of the two factories operating in New York, and the one at Fremont, Ohio; also by the readiness with which pulp feeding was taken up in Minnesota and Wisconsin, two dairy States.

The bulk of the pulp produced at the beginning of the sugar industry was in States in which stock interests were either not highly developed or consisted largely in grazing. The result has been that the farmers have been very slow to take advantage of one of the greatest opportunities offered by a sugar factory. The State of Michigan, for instance, in which at one time twenty factories were in operation, was not especially developed in stock interests. Within a short period twenty large concerns were established which put out thousands of tons of beet pulp and hundreds of barrels of waste molasses, both most excellent stock foods. Yet these, as a rule, were thrown away in the ravines, bayous, and waste places. There has, however, been great improvement in Michigan in this respect. The farmers are more generally feeding the fresh pulp. Two factories have installed pulp drying plants and are building up a demand for their finished stock-food product at paying prices.

If the farmers of Michigan, or any other place for that matter, where sugar factories are in operation, had grasped the full import of the advantages offered by a sugar factory, there would not now be any sugar mills whose idleness requires explanation. A sugar factory is not simply a market for a certain crop. It increases the values and rents of the farmer's lands. He can raise a crop of beets in which, from air and water, the sun has elaborated a certain amount of sugar, requiring nothing from his soil so far as the sugar is concerned. He hauls these beets to the factory, which buys the sugar and extracts it. The farmer receives his money for the sugar, and brings back home the residue of the beets—the pulp—and feeds it to his stock.

This pulp has been purchased from the factories for almost any price, from nothing to $1 per ton, depending upon the location of the factories. In many cases it was given to the farmers, and in many others they paid from 10 cents to 35 cents per ton—merely a nominal price—for a valuable feed. If the farmer had known in the beginning what most of them now know, he would have immediately increased the stock of his farm when he began growing sugar beets. He would have taken all his pulp, fed it to his stock, produced milk and meat, and sold them. He would have taken the resulting barnyard manure and put it back upon his land. If the farmer had adopted this policy and kept it up, there would have been no idle sugar mills now. He would now be able to say: "This beet business is all right. I grow a crop, sell a portion of its constituent elements to the sugar factory, bring back the rest, and feed it my stock, so that I do not have to devote other land to the growing of feed; I sell the animal product from this feed; I am able to keep more animals, and maintain a better balance between stock and crop production, and I am better able to keep the fertility of my soil up to the standard. The cultivation of sugar beets puts my land in much better condition, and I am able to largely increase the production of other crops."

There is no question that farmers living in the vicinity of sugar factories are now thinking more seriously along these lines, and that their more active support will greatly benefit the sugar factories in the future.

USE OF POOR SEED.

There can be no question that a good quality of beet seed is a paramount necessity in growing the crop. The selection of land has been mentioned as of first importance, if there is one thing more important than another. In this the responsibility lies with the farmer himself. Of course the agricultural experts of the factories give this matter considerable attention, but they must be guided more or less by the farmer's own statement as to the quality of his land. After the expert has made his recommendation the farmer still has the responsibility of following the directions in making the selection.

Selection of seeds is also of paramount importance. In the choice of seed the farmer must be relieved from any responsibility in the matter. The two important characteristics of good seed are (1) vitality or germinating power, and (2) the power to produce beets of high sugar content and purity. In regard to choice of seed the farmer must be guided entirely by the experts of the factory. So important is the use of good seed that the contracts of every sugar factory with which I am conversant require the farmers to use the seed furnished by it. The vitality of the seed materially affects the stand of beets. Many contracts provide that the price to be paid for the beets shall depend on the amount of sugar they contain. On this account the farmer is deeply interested in the reproductive power of the seed.

On the other hand, the factory is interested in the farmer securing a good yield of good beets in order that it may retain him on its list of beet growers. It is also interested in the sugar content and purity of his beets, since it can work high-grade beets at less expense, ton for ton, than beets of low purity and sugar content. Since the great bulk of the beets grown for the factories in this country are from seed imported from Europe, the factories are dependent for the quality of their seed upon the foreign beet-seed producers. From this fact have resulted many of the difficulties that have beset beet-sugar production in many parts of this country. Too much dependence was put upon the representation of the seed producers of foreign countries.

We began the production of beets in this country with every indication that an extensive industry would be developed, affording a large market for beet seed, each factory requiring several carloads every spring. Without any special knowledge at home of quality, it was assumed that foreign producers of seed would vie with each other in building up this market, and that the natural laws of competition would bring us seed of first quality. In this the factories reckoned without their host, although results might have been different with the old reliable established seed firms of Europe. In this business, as in every other, there is a class of producers who cater to a "shoddy" trade. They were aware of our ignorance regarding quality in sugar-beet seed. Agents were sent over here who represented firms that were not scientific producers of beet seed, but who went out on the market of Europe and gathered seed from every source available, including old seed bins, and "sweepings" or "clean-ups" of thrashing floors. These were mixed more or less with fresh good seed and shipped over here as high-grade seed. In other cases the standard "A" seed, from which the best field crops of Europe are grown, was planted to produce mothers, from which a crop of seed was grown direct and shipped to this country. Beets were planted again from this second seed to produce mothers to be used in growing seed for our market, from which many of the beets for our factories were grown.

During the years 1903 and 1904 this country imported approximately 5,250,000 pounds of seed annually. This seed cost the beet growers, in round numbers, three-quarters of a million dollars each year.

From time to time our factory managers and experts, interested in the development of the beet-sugar industry in this country, have visited these older countries. They have found a sentiment there not conducive to our best interests in securing seed of the best quality. It must be evident that to build up the sugar industry in this country is more or less against the interests of these older countries. They have been exporting to us a considerable part of the sugar we consume. It is of more importance to these seedsmen to have the beets grown there, so as to give them a home market for their seed, than to help build up an extensive sugar production here. They were perfectly willing to sell us the seed if we demanded it, but as to quality of seed they were not anxious to discriminate in our favor against their own home producers.

One of the best-known experts in the United States, who has devoted years to the beet production of Europe, said: "You can not dream of the disaster that would follow to the sugar production of the older countries if it were possible for them to export what is known as the high-grade 'A' seed. There is not nearly enough of the 'A' seed to meet the demands of European growers." It would appear to be a plain case, from this statement, that as a matter of fact there has been practically none of the "A" seed sent to this country. It is also a fact that we have not been able in all cases to secure the second-grade seed, such as is much in use there. Thus we have been hampered by crude ideas of our own in growing the beet crop, and to some extent by the machinations of irresponsible, designing seed dealers of Europe. There is absolutely no definite information as to the extent to which this has occurred. It is safe to say that this circumstance contributed much to the discouragement of our early beet growers. Finally it led to an investigation by home producers, as a result of which the evil has been largely corrected. Many of our managers, superintendents, and proprietors made personal visits to the seed-producing districts of Europe, studied the conditions of seed production there, and placed their contracts with responsible firms.

In my last report I made a detailed statement of the methods used in the production of high-grade sugar-beet seed. A perusal of this statement makes it clear that the process is expensive. It also shows that considerable time is required to carry out the successive steps involved in producing a crop of seed. These steps are necessary to maintain the high quality of the seed. Of this our factories are fully advised, and they have placed their contracts accordingly. I have known a case where the entire supply of beets for a factory for the season were the product of inferior seed, and the beets averaged hardly above 10 per cent of sugar, with the purity equally low. It was the factory's first campaign. No factory, no matter how large its supply of beets, could make a profit. It could not survive in competition with other factories securing beets with 15 to 17 per cent of sugar, and a purity of 80 to 90. In the case of this particular factory, the results of the first year's work were more disastrous. It could not survive the shock administered to its beet growers and financiers. It closed its doors and dismantled, and is no longer heard of. Such errors are not common to-day. They are hardly possible, but they will remain green in the memory of those who are conversant with the things that crippled and hampered the beet-sugar industry in its earlier stages.

INADEQUATE EXPERIMENTATION.

The original information concerning the production of sugar beets in this country that was used as a basis on which to found the beet-sugar industry was secured by making experiments in raising beets in various parts of the country. Looking back, these experiments appear to have been inadequate, often ill-advised, and in a measure conducted in an irresponsible way. No doubt they were the best that could be devised under all the circumstances. They emanated from a great variety of sources. They were instituted everywhere and apparently by everybody—ministers, lawyers, doctors, farmers, editors, professional agriculturists, railroad companies, real-estate agents, college professors, State experiment stations, and the United States Department of Agriculture.

A great variety of printed matter appeared on the subject, ranging from statements based on the most meager information to the very learned translations of the most scientific character. In advice there was nothing lacking, such as it was, but there was no one particularly qualified to sift out the good from the bad. We were on the high road to the beet-sugar industry and nothing but experience could ever give us the real facts. That experience we now have had and it is not to be regretted. Out of all the confusion came some very valuable data. We have gradually learned right principles and discovered errors. Under the same circumstances I am sure that if we had the work to do over again it would proceed along the same lines. We simply started blindly and in the dark and felt our way out toward the light. Where definite knowledge and experience are lacking there is no better way.

Most of these preliminary experiments were conducted by farmers who secured seed from and worked more or less under the direction of some State experiment station, or the Department of Agriculture, or some association organized to promote the industry.

In 1897 the Department of Agriculture received thousands of individual applications for beet seed. Congressmen had small packages sent broadcast over their districts. Many of these packages contained accurate directions for conducting the experiments—some did not.

Ambitious towns, societies, and organizations of different kinds forwarded lists of farmers, to whom the seed was sent. State experiment stations made up from their bulletin lists a collection of names, asking them to make experiments.

The Division of Chemistry of the Department of Agriculture and the chemists of the State experiment stations requested these farm experimenters to collect and forward samples of the beets grown for chemical analysis, and Government franks were supplied, to save the farmers expense in complying with this request. The samples came in by the thousand, in every form of order and disorder. Some beets were dried out and wilted before they reached their destination. A beet from which the moisture has evaporated before testing shows a considerably higher percentage of sugar. And there were many irregularities of this and other kinds.

The worst feature of these experiments appeared on the farms where the beets were grown. It seemed almost impossible to induce the farmer to set apart any portion of his good land for conducting these trials. He said: "I am getting nothing out of these beets, so what's the use?" As a rule farmers are not given to experimentation. A really scientific experiment ignores profit. It is purely an educational matter. Not a large number of our farmers incline to this sort of work. The same reasons that actuated them in the selection of the land operated in the cultivation of the crop. During the year mentioned I visited thousands of these experimental plats in different parts of the country and I think it is safe to say that I did not find over a dozen really well-conducted scientific experiments.

Upon such a showing of facts was our sugar industry instituted. In the light of such facts the reason for the obstacles encountered becomes clear. But to-day sugar factories are built in territory in which beets have been grown for the factories, thus demonstrating the actual fitness of the conditions.

INTERDEPENDENCE OF FACTORY AND FARM.

There is such a community of interests between factory and farm in the production of sugar beets and manufacture of sugar that it is hard to draw a definite line of separation. The factory is vitally interested in everything that pertains to the success or failure of the work on the farm. The factory must feel assured that the farmer is sufficiently remunerated to induce him to grow the crop. It is also directly interested in the quality of beets the farmer grows.

Every move on the farm or in the factory is intimately related to the cost of production. If the beets are brought in dirty, the manufacturer is at additional expense for cleaning them before they enter the processes of manufacture. Often in a load of beets there are pebbles, pieces of iron, and other articles which find their way through the sluice gates, into the elevators, and finally up to the delicate slicing knives. These are dulled or broken; machinery may be wrenched and disabled, causing loss of time and a large expenditure of money for repairs.

The very foundation of the factory's success in sugar production is its supply of beets. Every factory is constructed to slice so many tons of beets per day (its capacity) and to continue the process for a certain number of days (its "campaign"). If it secures a sufficient supply of beets to meet this capacity for the full period, much has been accomplished to insure success.

Again, if the beets only contain a small percentage of salts of different kinds, naturally entering into the beets ("impurities"), the work is greatly facilitated. In the process of making sugar these salts operate to hold up the sugar from crystallization. Extraction becomes difficult in proportion to their presence. If the beets are high in sugar content, more sugar is secured from the same amount of beets and factory energy than would be the case if they were low.

The supply of beets, their purity and sugar contents, are all governed largely by the work on the farm, viz, the selection of the land, its preparation to receive the seed, the time and manner of planting, thinning, bunching, cultivating, and harvesting, and the delivery of the product.

TOO MUCH ENTHUSIASM AND HASTE IN ESTABLISHING FACTORIES.

The beet-sugar industry was started with a little too much of our well-known American enthusiasm. There was too much of the kind of excitement often aroused by the discovery of a valuable find in a new mine, or the selling of corner lots in a new town. Other leading agricultural industries had started with the early settlement and developed with the country; or, if introduced later, they came as natural results of specific demands. There were very few farm products the working of which required large capital. Probably the packing and milling industries of the country were most extensive of this class; but they began with our earlier history, were operated through pioneer methods, and gradually developed to large concerns. With the beet-sugar industry it was different. It was proposed to establish a factory at a cost of $500,000 to $1,000,000 in a community with absolutely no information concerning the needs of the industry. It was proposed to employ a small number of experts in the factory, but the proprietors themselves were absolutely without experience. But little was known concerning the agricultural problems involved in the growing of the beets. The first year nearly everybody was swamped with work in the fields owing to the lack of help, as insufficient arrangements had been made. The demand for more help came from every direction. Laborers were sought in the adjacent country, the cities, and more remote sources of supply. Only an insufficient supply could be secured, and the laborers were nearly all inexperienced.

Yet investors really anticipated a dividend the first year under such conditions. The farmer made a poor selection of soil, did poor work in the field, and delivered poor beets to the manufacturer. Also his eyes gave heavier weights to his beets than the scales at the factories. When his beets were tared they were found to contain more dirt than he supposed. Contentions arose and bad feelings were engendered.

At least 60 per cent of the factories now in existence had to go through an experience of this sort. Capitalists, business men, and farmers all over the country seemed to have the one idea that a sugar factory was a highly beneficial institution financially. There is probably not a town or city in the sugar-beet belt that did not at one time or other have the beet-sugar craze. In their archives may be found the history of their agitation of the subject. A barbecue was held, the farmers of the surrounding country were invited in, the hat was passed to pay expenses. An ox was roasted and the public feasted in some hall or grove. The band played, the people shouted, and everybody shouted "Hurrah for the sugar factory!"

In many cases all this noise and enthusiasm led to the establishment of a factory. The town gave a site and exempted it and the improvements on it from taxation. The substantial basis for all this excitement was the fact that some experiments had been conducted on a few plats of ground in the neighborhood during one season, capitalists putting up the money, the farmers growing the beets. It is not my purpose to decry this enthusiasm, nor even to suggest that it was unwise. It was probably necessary. As a final verdict at least the results of most plants will substantiate the wisdom of their location. It is proper, however, to state that the early events in the operations of these factories should be viewed in the light of the facts just stated.

The sympathetic, intelligent, and active support of a farmer is as essential to a sugar factory as is food to an animal. In order that a farmer may produce beets for the factory, he must first be convinced that they are profitable, and considerably more so than other farm crops, as the expense of production is so much heavier. He must know how before he can produce beets at a profit or employ the best methods of cultivation.

The hurrah spirit has subsided. In its place we have the cold facts and conditions upon which rest the future of the sugar factory. Through the reaction most of the factories have passed successfully. A few are idle, with the issue indeterminate as yet.

The establishment of a new factory now proceeds on entirely different lines. With one or two exceptions the twelve States now producing sugar beets compose the area from which we will procure our beet sugar in the future. The factories now in existence are the training schools which promote the establishment of others. In securing its supply of beets a factory in the start naturally covers a large surrounding territory, but gradually contracts the area until it can secure a sufficient supply in its own locality. Perhaps a factory in another vicinity overlaps or reaches up to the area of the first, but its territory also contracts in like manner. The result is that the farmers throughout a large district are educated in the art of producing sugar beets. They have also fully tested the fitness of the soil for the production of this crop. As the factories gradually increase their tonnage and secure their supply nearer home large areas where the farmers are educated in growing beets and desire to produce them are left without a market for the crop. A new factory becomes a necessity to this district. There is nothing haphazard about its introduction. Everybody interested knows exactly what can be accomplished. They go into the work with eyes open, each willing to do his share. The factory starts, and it succeeds from the beginning. It is thus that the extension of the beet-sugar industry now appears to be going on.

WORK OF PROMOTERS.

Mention of the promoter carries us back to the barbecue, the brass band, the public assemblage in the town hall. So many towns have had this experience that I will give one coming under my observation as typical of all.

A man had arrived in the town a few days before and had called on a few citizens of wealth and influence. He had a proposition to make. He said he was associated with several public-spirited financial gentlemen who were prepared to put up a sugar factory in that particular town. He had an array of facts showing the favorable conditions for beet growing in the farming community. The country could produce the beets, the town had the pure water, cheap transportation, good coal, limestone, and everything necessary near at hand. It was handy to market, and everything appeared to be in readiness for the building of a sugar factory. This would build up the town and start a boom. All that he asked was that a few of the responsible people organize a beet-sugar company and subscribe for half the stock. He and his associates were to subscribe for the other half. In addition, he must have a bonus of $150,000, possibly to be taken in stock. The town was to give a site, connect it with the water main, put in a spur, exempt the site and factory from taxation for a period of years. The factory he proposed to build was a 350-ton plant, costing $350,000, which he proposed to stock for $500,000 in order to cover his bonus. It is probable that there was nothing back of Mr. Promoter. He intended to take the gifts and the prospects offered by the town to some beet-sugar factory constructor and propose that he take the contract to build the factory, taking as part payment some of the stock in his hands for disposal and find capitalists who would pay cash for the rest.

I do not know that many factories were constructed as a result of such promotion. The promoter early demonstrated himself a failure as a factor in developing the industry. He was a positive hindrance to it. He wrought up many localities to a high degree of anticipation. After long waiting the bubble exploded, and the suspense had done the work. The effect of the reaction was great. It was hard to get such a community to listen again to anybody proposing a beet-sugar factory for the town, no matter what merit the proposition had.

Some of our factories, however, resulted from the work of the town boomer, and most of them have fully realized every prediction, whether honestly intended or not. Towns of several thousand inhabitants have been built up through the combined influence of the sugar factory and irrigation in the short space of one or two years. They show every evidence of permanence and prosperity. It must be evident, however, that in some places town-booming methods are ill-advised in establishing a sugar factory.

ATTEMPTS TO USE OLD MILLS.

When it became evident that we were to build in the United States a considerable number of sugar factories, there appeared on the scene agents who were in the business of hawking about old mills from one place to another and unloading them on innocent, unsuspecting communities. After such a mill had thoroughly demonstrated its uselessness and the seller's commission had been paid, it was ready to be taken on to some other point and disposed of again. At least three of these migratory factories found their last resting place in the United States. So much traveling permanently disabled two of them, and with the other an additional expenditure equal to its original cost of installation was necessary to modernize it and make it available, efficient, and useful. Of the whole number of factories that have been built in the United States in the last fifteen years, only three have been actually dismantled and disposed of for other purposes, and two of these were the ones mentioned above. Two other factories have been removed and installed in new places, where they are doing active work to-day under more favorable conditions.

LACK OF EXPERT FACTORY OPERATIVES.

A factory is working at its best advantage when everybody connected with it, from the day laborer in the beet sheds, who shovels the beets into the sluice ditches, to the superintendent of the factory, understands perfectly his part of the work. In such a factory the work goes on like the running of well-oiled machinery. A certain quantity of beets comes into the washer hourly and regularly. The power is regulated exactly to meet every demand of the factory. Everybody does his particular part of the work in the right amount at the right time, and he does it intelligently. All are in a sense experts.

When the sugar industry started in this country, we had no experts except those imported. We were dependent upon foreigners. After a while we had, in addition to these, a small supply gradually educated in our factories. It is clear that every new factory had to start with a minimum of experts. Comparing the work of our factories to-day with that of a few years ago, it must be apparent that there is a vast improvement. Even at present the older factories are not able to hold their full force of trained laborers on account of new factories coming into operation, thus affording opportunites for promotion of those having experience in beet-sugar making.

A laborer requires other qualifications than expertness. As a rule he must, to some extent, supervise others, or work in conjunction with them. If foreign, he is deficient in the language and in a knowledge of the customs and habits of the country. He may be an adept in his own country, but here is to some extent disqualified because of those deficiencies. It is found much more desirable that expert laborers should thoroughly understand the language, customs, habits, and conditions of our own country. Foreign experts may, of course, gradually acquire these qualifications.

As an illustration of this necessity for intelligent cooperation among factory operatives, attention is called to the following facts: For general consumption the American demand is for sugar of a different grain from that commonly used in Europe. Sugars for fruit preserving and confectionery may be different from those for table use or from each other. While all our sugar mills are catering to the American market, they may also be catering to a specific market for a particular kind of sugar. As the graining of sugar is governed by the joint action of several people in the process of its manufacture, intelligent cooperation throughout the factory is required from start to finish in order to produce a good grade of the kind of sugar desired.

LACK OF COOPERATION AMONG BEET-SUGAR MANUFACTURERS.

Business harmony in the conduct of affairs is a prime necessity in every enterprise. The lack of it in the building up of the beet-sugar industry has been pronounced. To suggest the cause, I have only again to call attention to the enthusiasm, haste, and confusion incident to the establishment of many factories. The men conducting large enterprises such as these should have a full understanding of the needs of the industry and should cooperate in order to secure the desired results. In many respects the interests of all beet-sugar factories are the same. Questions like that of markets, of transportation, and of legislation demand unity of action. This can only be secured through a unity of feeling and hearty cooperation. That there has been general lack of harmony in this respect is a matter of history. This has probably been due, more than anything else, to the general cosmopolitan training of the men who entered into the financing of this industry. Men are the creatures of their environment and training. Different kinds of business require different methods. A man is prone to use the methods which have brought about the success of his life.

Back of the installation of every sugar factory is a history of its financing which is peculiar to the conditions of its own vicinity. The business trend of each was naturally governed by the men who installed it. They represented many callings—bankers, lawyers, lumbermen, large landholders, stock feeders and breeders, sugar refiners, churches, steel constructors, glass producers, brewers, and distillers. The managements of these factories adopted methods peculiarly their own. They started actively into the fields to establish a career of usefulness and success, each along its own lines.

It took a few years' experience to bring these factory people together on common grounds, to make them appreciate that "In union there is strength," and to teach them that there are a few things peculiar and necessary to the beet-sugar industry, and best accomplished through better understanding and cooperation. The proceedings of the National Association of Beet-Sugar Producers at its last meeting, held in Washington in May, 1904, thoroughly demonstrated that there has been established better harmony of feeling, better understanding of the problems involved, and cooperation more thorough and effective among the producers of this product.

INSUFFICIENT CAPITAL.

In view of the many difficulties to be met by a factory in working out the pioneer problems of a new industry many of the plants were insufficiently capitalized. In many cases only sufficient to bond the enterprise was paid in. It started in debt and with a minimum working capital. To maintain this it depended largely upon the sales of its finished product, which it was compelled to sell as fast as produced, regardless of the market or anything else. When such a factory had to meet unanticipated difficulties one after another, it became crippled, legally involved, and led a precarious existence. Its case was similar to that of a man whose system is run down, and who consequently becomes subject to the attacks of disease germs of every kind and is finally incapacitated for active duty. Heroic methods are required under such circumstances. Some of our factories have been compelled to reorganize, recapitalize, and strengthen themselves to meet conditions such as I have just described.

LOW PRICE OF SUGAR.

In addition to many other difficulties encountered, our sugar factories until recently had to dispose of their product at a low price and under severe competitive conditions. This situation resulted from natural causes, being largely due to the overproduction of sugar in Europe. Sugar production and markets there were based on very unnatural and peculiar systems. Those countries paid large bounties for sugar exported. In order to secure the money to pay the bounty they practically exacted a consumption tax. In the first place, they put up a prohibitive tariff of 4 to 5 cents a pound on imports of sugar. This prevented importations. The Government then collected from each factory a tax on all sugar sold for local consumption. Out of this excise tax the Government was enabled to pay the manufacturers a large bounty for sugar exported; that is to say, through this give-and-take system it made the people pay large sums of money on sugar exported to other countries. Sugar sold at retail in those countries at 10 to 12 cents per pound. The exporters of sugar could bring that sugar over here under the encouragement of this bounty, pay our tariff of $1.68½ per 100 pounds, and place it on our market at a very low price.

Of course the real profit to them was in selling sugar to their home consumers, and each one of them vied with the others to produce as much as he could for his home market. They were enabled to hold the price up to the highest point not prohibitive to consumption. Whatever of surplus was produced for which there was no demand at home was exported, received this bounty, and was dumped on any market where it could find a customer. Much of it came to this country.

This unnatural system became so burdensome to the people, the governments, and the manufacturers themselves, that all the European countries engaging in it except Russia united in a conference at Brussels, their representatives entering into an agreement, which was indorsed by their respective governments, to do away with the bounty system. In name the bounty system has been abolished. In effect there is still more or less of the system in use, through hidden devices of the various countries seeking to accomplish the same through other means.

This has brought about more or less diplomatic representation between those powers. Gradually they are unearthing the roots of the old system and digging them out. It seems probable that they will be destroyed altogether. Suffice it to say, sufficient has occurred in this direction to produce good results in the markets of our country; our factories are receiving better and steadier prices and conditions seem to indicate that these better market conditions will continue for some time. The European countries referred to are gradually reducing their plantings and contracting their exports.

DEVELOPMENT OF CONDITIONS AND PROSPECTS FOR NEW FACTORIES.

During the last year four large factories were installed in new locations, two in Wisconsin and two in Idaho. One of these factories is new, while the other three are old ones removed from locations where they had not thrived. At the present time there are at least twelve factories proposed for the different parts of the country, the parties interested having effected organizations, raised capital, selected sites, made contracts with farmers, and announced that the factories will be in operation during the campaign of 1905.

In my former reports I have had occasion many times to mention the influence the beet-sugar industry is exerting for development along all other lines in the States where it has been established. Throughout the districts having factories, railroads are being built, some of them equipped with rolling stock constructed especially to transport the beets, the sugar, the fuel, and other crude materials used in the manufacture of sugar. At the same time trolley lines are being constructed. Live-stock feeding interests are becoming greatly increased; dairies and creameries are being established to utilize the by-products of the sugar factories.

Where the cultivation of sugar beets has obtained to any great extent there is a very noticeable improvement in all agricultural methods. A farmer growing sugar beets for a few seasons becomes accustomed to intensive methods, and as he realizes the benefits he applies such methods to everything else cultivated on the farm.

LOCATING NEW FACTORIES.

Great care is now exercised in selecting locations for new factories. The four factories established this year were located in communities having considerable experience in growing sugar beets, not experimentally, but for factory use. The factories proposed for next year are all to be located in places where all the conditions for growing sugar beets have been thoroughly tested. Experience teaches that it is not only necessary to test the soil, but to investigate the demands and requirements of the particular districts. It is especially desirable to ascertain the disposition of the farmers and the character of the industries with which the industry must come in competition. There appears now to be a tendency to locate new factories in districts where the production of other special crops is not highly developed.

Several of the new factory projects involve industrial development along other lines, such as irrigation, dairying, and stock feeding, which will be more or less dependent on the sugar factory. Many of the new companies have purchased large bodies of cheap land. The object of this step is twofold: (1) It puts under the control of the factory the area of land which will guarantee at all times a sufficient supply of beets; (2) it affords an opportunity for good investment, as a rise in the value of lands may be expected as a result of the establishment of the factory. In order to use the arid districts, irrigation is necessary; consequently, considerable investment of capital in irrigation is necessary. These lands will be held and cultivated in a body for the benefit of the sugar factory. After the conditions have been thoroughly developed and the industry established, they will be divided into smaller tracts, and rented or sold to beet farmers for use in raising sugar beets. Whatever the purpose, experience has proven that this policy will be very beneficial. Growing of sugar beets will be the main employment of the community. The work will begin with the early development of the resources of the district itself; beets will not have to be grown in direct competition with established crops. When the time comes for introducing such other crops, the beet crop will have made its own record and established that permanency of beet supply upon which the sugar factories depend.

The past year has witnessed the moving of a few factories not favorably situated to better locations. Attention has already been called to the various obstacles to the success of sugar factories, viz., the attitude of the farmers, unfavorable soil, irregular weather conditions, competitive crops, etc. While these obstacles have not affected seriously a great number of the factories, they have individually or collectively operated with sufficient potency to stop the wheels of six factories. Of the four plants installed this year, two were previously operated in other places in this country: (1) The factory at Binghamton, N. Y., was moved to Blackfoot, Idaho; (2) the one at Kalamazoo, Mich., was moved to Chippewa Falls, Wis. The factory established at Janesville, Wis., this year, was moved from Dresden, Canada. The factory at Norfolk, Nebr., the property of the American Beet Sugar Company, is now being moved to Lamar, Colo. In these cases and others, where removal is proposed, the factories have been, or will be, improved and placed in districts with conditions better fitted for furnishing them a supply of beets.

It is only fair to state that the unfavorable conditions causing the removal of these factories were not necessarily fatal to their successful operation where they were. It is the opinion of those best advised on the subject that their difficulties were not insurmountable; that in time good management would have overcome all the obstacles ahead of them. Those who were financially interested, however, reasoned in this way: "There are a great many places in this country adapted to the industry, where the difficulties in the way of success are far less. Is it not wiser to take advantage of these and pay the cost of removal than to struggle along or lie idle for an indefinite time?" There are two or three other plants in the United States whose managements have been contemplating the same thing. Hence, we may have two or three removals next year or the year following. When this is done we will have closed the corrective work of locating factories up to date. Locations are now based on better information; the conditions of the country are better understood.

SUPPLY OF LABOR FOR FACTORIES AND BEET FIELDS.

There has been marked improvement in the character and supply of labor. When a sugar factory starts its first campaign it employs from 200 to 400 persons in its work, the number depending on the size of the plant and conditions peculiar to it. A number of these will be unskilled workmen, performing the ordinary manual labor around a concern of this kind, viz, shoveling beets, fuel, lime rock, etc.; others will be employed in work more or less skilled. The wages for skilled laborers range from $2 a day up to $5,000 or $6,000 per annum for the superintendent. For the lowest group of laborers I have used the term "unskilled;" but, at the same time, as between first experience and that after becoming accustomed to the work there is a vast difference in the efficiency of such labor. To an extent, all of the workmen around a sugar factory are skilled. Advancement or promotion goes on all along the line, except possibly in the technical departments, such as chemistry, etc., where strictly technical scientific training is required. In a sense, the sugar factory is a school fitting men to accomplish its work.

As already stated, in the beginning all the experts employed had to be imported. Since the establishment of the first factory, at Alvarado, Cal., we have been fitting men for this work. The volume and efficiency of labor has been growing constantly ever since. While it is best for a factory to hold on to its old employees, it can start a certain number of new men each year without serious consequences. This it will probably have to do if some new factory requiring expert workmen tenders positions to some of its trained men at higher wages. Consequently, there is still large room for improvement in the supply and quality of our factory workmen.

The question of developing and maintaining the supply of laborers for the beet fields is of equal importance and is certainly a much larger problem. The minimum number of laborers around an ordinary factory is about 200. For such an establishment the number of farm laborers needed in its territory for growing sugar beets, not including the farmers themselves, will be from 800 to 1,000.

As in the case of the laborers in the factories, we had no trained men to begin with. The deficiency was even more pronounced in the field than in the factory. Much of the work in the factory could be done by persons who had been trained to do similar mechanical work in other lines of industry. But the great problem that confronted capitalists contemplating the building of factories and the managements of factories actually established was: "Where are we going to secure the labor to grow the beets?" It certainly was the hardest problem they had to solve. As indicating the effectiveness of its solution and suggesting its future development, I will outline the present procedure in securing supplies of labor for the fields tributary to the factories now in existence.

Living in cities there is a class of foreigners—Germans, French, Russians, Hollanders, Austrians, Bohemians, etc.—who had had more or less experience in beet growing in their native countries. Their experience had been largely agricultural. Emigrating to this country, they had congregated in cities and towns, and were performing the work of ordinary laborers on public works, on railroads, and in various other lines of employment. Their attention was attracted to this industry when it started—old to them, new to us. They naturally sought this new avenue of employment. It appealed to them for two reasons: (1) They could secure employment in work to which they were accustomed and in which they were expert; (2) in the beet fields they could find work for their whole families. In this respect it differed from other lines of work. The head of the house could go out and dig in the trenches of the city, or work on the sections of the railroad, or in excavations and other kinds of employment under a contractor. The women and children of the family could not do this. Growing sugar beets was a renewal of their former experience. For the work of the beet fields more came from the cities each succeeding year, and others came from Europe, induced by the news of the installation of this new industry. They could secure immediate employment of the kind to which they were accustomed. This source of labor supply for our beet fields has grown to a wonderful extent. Every spring sees large colonies of this class of workmen moving out from our cities into the beet fields.

There is another class of foreigners, not previously experienced in growing beets, who readily adopted it on account of their natural adaptability to the system. As a class, they are accustomed to hard drudgery work of any kind, spending their lives during their stay in our country in work on public improvement, railroads, large contracts, etc., requiring hard manual labor. In this class come the Scandinavians (a few of whom have grown beets), Italians, Japanese, Chinamen, Portuguese, etc. Large numbers of these, annually increasing, take contracts in the beet fields. All these foreign laborers, of whatever class, live in tents, barracks, and other temporary abodes. They board themselves, and grow sugar beets under contracts with the farmers. It is rulable in such cases for the work to be done by the acre. The farmer plows the ground, harrows it, puts the seed bed in thorough condition, plants the beets, and does all the necessary cultivation requiring horses. The contracting laborer does all the weeding, bunching, thinning, hoeing, irrigating, topping, and loading, usually receiving for the same from $15 to $20 per acre. The farmer does the work of plowing up the beets and delivering them to the factory. Foreigners of this latter class were originally more or less unsatisfactory on account of unfamiliarity with the work. After five or six years, most of these workers in the beet fields are efficient. The additional hands accompanying them each year have the advantage of association with those acquainted with the methods, and become satisfactory workers more readily than otherwise. To this class we are also procuring large accretions every year, thus augmenting the sources of labor supply of sugar factories and sugar-beet growers.

Philanthropic societies and eleemosynary institutions are also gradually aiding in this respect. One of the strongest addresses made before the Trans-Mississippi Commercial Congress at its meeting in Seattle, Wash., last year was that of Commander Booth-Tucker, the head of the Salvation Army in this country. In this address he explained the policy maintained by that society of finding employment for everybody coming under the army's influence. The beet fields appealed especially to him in this connection. He proposed colonization from our larger cities, using the beet fields as means of reformation and employment. The plan as he represented it greatly impressed all who heard it. As a matter of fact, considerable has been done by this organization along this line. It is also quite common for the humane societies, associated charities, and other like organizations of our cities and towns to procure, for those dependent upon them, employment in the beet fields.

Our State reformatory institutions and asylums are also developing an interest in the work of growing sugar beets. One of the great problems of such institutions is to keep the inmates employed; in so doing it sometimes happens that they come in conflict with the rules of organized labor. Possibly if the supply of labor for the beet fields exceeded the demand the same objection might operate here. Under the present circumstances it does not appear to be deleterious to regular labor. If these people can be employed in rural pursuits it will have a tendency to strengthen rather than to hurt labor in regular lines.

Our cities and towns are constantly increasing in importance as sources of labor for the beet fields. Every year sees more and more of the unemployed seeking the beet fields for remunerative work. In this respect we are developing a practice similar to that which prevails at harvest time. Most people are familiar with the movement of laborers annually taking place from south to north, following up the grain harvest as it progresses with the season. Harvest hands pour into the South with the ripening of the grain, gradually working north as the work is completed, finally winding up with the harvest in Canada. This custom has developed the class of laborers known as professional harvesters. Similarly we are developing a class of beet growers, who move toward the fields on the approach of the beet season. To this class are continually added recruits who in a season's experience become more or less proficient.

Our beet fields are also the beneficiaries of another class of labor possibly more abundant, and at the same time adaptable to this work. In the cities and towns public schools close about the time the active work begins in the beet fields. Considerable attention is being given to directing this kind of labor to beet growing. It is a matter of consequence and one fraught with valuable training to the unemployed young people of the country. Ordinarily there is very little that a boy can find to do during his school vacation. It so happens that the beet fields offer active remunerative employment for this particular period. This work serves a twofold purpose: It gives a boy self-support to a degree, and relieves the head of the family to that extent; it also lessens the work of charitable institutions. At the same time it inculcates habits of industry and frugality, removes the boy from the temptation of idleness and the school of vicious habits constantly in session in the streets of our cities and towns. It promotes health, physical strength, and vigor. It inspires confidence and self-support. This applies not only to the poorer classes, but to all boys who otherwise would be idle.

Keeping the boys of the cities and towns employed, especially those who are drifting into the classes of chronic idlers and criminals, is one of the social problems of to-day. During the past few years agitation on the subject has crystallized into a policy of establishing juvenile courts. (See page 147.) Idleness is the most prolific of all causes producing the two classes named. The work of these tribunals contemplates segregation and useful, healthful employment under supervision. Several States have enacted laws establishing such courts, and relegating to them cases of juvenile offenders. Such a court has regular officers, who list boys liable to its supervision. Such cases as come before it regularly, it places under the care of its officers, who direct them to some field of active employment. In districts having sugar factories, the beet fields have been playing an active part in this species of education and reformation. At first the plan did not prove very satisfactory. These boys, in groups or individually, were hired out to farmers, who found themselves without authority, and as a rule without disposition to exact of this class of workers faithful performance. In most instances the boy was soon back in his old haunts. During the past year a better system involving closer supervision was maintained. The boys were sent out in groups, with their probation officer over them. This officer was clothed with full authority for maintaining discipline and executing the demands of the court. A group usually consisted of 20 boys, who formed a club, all sharing equally in the expense. A cook was hired who prepared all food. Contracts for the group were made by the officer; he was present at all times to maintain discipline and the faithful performance of the contract. The money earned by each boy was paid over to the court and credited to him after deducting his share of expenses. Under this system juvenile court work in the beet fields was much more satisfactory.

It is plain to be seen that, through these various sources of labor for our beet fields, conditions at the present time are very much improved. Whatever the source of supply of labor, it is constantly increasing and improving. Under the circumstances I should say that the labor problem of the beet-sugar industry is adjusting itself as rapidly and satisfactorily as any other feature of its development.

BETTER COOPERATION AMONG THOSE INTERESTED IN THE BEET-SUGAR INDUSTRY.

There is closer and better cooperation between the factories and farmers, as well as among the factories themselves. There were many things that led to contention between the factories and farmers. One of these was the question of tare. The amount of tare varies widely, depending upon the condition of the beets delivered to the factory. This again is dependent upon the kind of soil producing the beets, and upon the condition of the soil when the beets are harvested. In clay soils dirt is more liable to adhere to the beets than in sandy loam; and more dirt adheres when the ground is wet and muddy than when it is dry. Neighboring farmers may deliver their beets at different times or they may have different kinds of soil. One farmer's tare may be high and another low. Every farmer's tare is known to every other farmer in the district. Those who have high tare feel dissatisfied. But there is no place to settle the question except at the scales of the sugar factory. Experience is doing away with a large part of this controversy. Everybody concerned has more adequate ideas of the things affecting tare. Farmers find that while they have low tare one year it may be high the next; that natural conditions govern these things.

Many of our farmers have had contracts providing that payment for beets be made on a "sliding scale." It is customary to establish as the standard of quality for the beets a sugar content of 12 per cent and a purity coefficient of 80. For this the factories pay a certain minimum price. Beets of higher sugar content and purity command a higher price. All beets are tested as they are delivered at the sugar factory. A sample is taken from each wagonload or carload, thoroughly washed and reweighed, the resulting loss in weight being the tare. A tag is attached to each sample, and on it are recorded the results of the various tests. After the tare has been ascertained the sample is then handed over to the chemist of the factory, the juice is extracted from the beets, and a test of its sugar content and purity is made. From the data on the tags records are made up in the bookkeeper's office. These records of tare and average contents and purity of the beets are used in computing the amounts due the farmers. Payment may be made once a week, or once a month, or when the farmer has delivered all his beets.

Under this system there is a wide divergence between the highest and the lowest prices paid to the farmers of a particular community. Sugar contents and purity, like tare, are largely dependent upon circumstances. They are especially dependent upon the way the beets have been treated during the growing season, the kind of soil, its previous use, the preparation of the seed bed, the bunching and thinning, the cultivation, etc. At first it was difficult for the farmer to see why his beets should not rank as high as those of his neighbor. He felt himself at the mercy of the sugar company in this respect. As to the factors controlling quality in beets, after growing them year after year, he is becoming better informed. He has discovered that the quality grows higher as he applies the proper methods. Farmers more generally apply these methods now, and, as a result, they are producing better beets. As a rule the factories and the farmers are gradually getting nearer together, and are cooperating with less friction.

As the improvement of beets produced for our sugar factories proceeds and they become more uniform in character, there is a general tendency to abolish the "sliding scale," and to pay a higher "flat price" than formerly.

Factories are more methodically cooperating with each other in all matters pertaining to the general welfare, viz, legislation, markets, transportation facilities, tare, crop districts, etc.

In some places factories were installed with capacities beyond the pioneer resources of the district. Among the factories in such districts there has been considerable controversy as to the legitimate territory belonging to each. Farmers would contract with one factory and deliver beets to another. The first factory would then replevin the beets under the contract; this would be followed by litigation, losses on account of holding the beets, etc. Such things have compelled a better understanding among all concerned.

In the methods of some of our early factories there was a tendency to carry on the work behind locked doors, and to throw an air of mystery around the operations. But at present there is hardly a sugar manufacturing company in the country that will not have shown through its establishment persons or groups of persons engaged in honestly investigating this industry. Whether investigating a particular feature of the work, or the sugar industry in general, such visitors are given every aid.

The proprietors of factories are cooperating in securing more equitable rates from railroads, better arrangements with commercial distributors of their products, a better appreciation on the part of the public, and a more systematic encouragement on the part of the press.

They are planning and executing needed improvements in their factories, they are making more systematic efforts to secure high-grade beet seed for the farmers, and they have succeeded in establishing closer harmony between the factory agriculturist and the beet growers. In inspecting and selecting the land which it is proposed to devote to beet culture, these agriculturists have become better informed as to the nature and condition of the soils with which they have to deal, and they more easily induce the farmers to follow their directions. Consequently better cultivation is secured, and there is a growing tendency to systematic fertilization.

Mention will now be made of the new projects contemplated for the future, with a review of the conditions prevalent in the localities selected, so far as investigations have indicated the same.

CALIFORNIA.

California was not only the early home of our beet-sugar industry, but it has made steady progress, and, up to the year 1904, it has held the first place as a beet-sugar-producing State. Colorado, however, produced more sugar this season. The State of Michigan has in the aggregate a factory capacity for producing more sugar than California, but it has not done so up to date.

The factories of California are very large, some of them among the largest in the world. The beets grown in the State are very rich in sugar; conditions in the State for producing sugar are more settled and have been longer under development.

In earlier reports I have outlined to a considerable extent the many advantages of the State of California for the development of this industry. It is estimated that the people of California, Washington, Oregon, and adjacent mountain States consume annually something like 100,000 tons of sugar, thus making a large and convenient market for the product of the factories. Formerly most of the sugar produced in the Hawaiian Islands went around the Horn to the Eastern refineries. About 50,000 tons were shipped to San Francisco, refined, and distributed to the market above mentioned. California supplied the rest. This situation did much to encourage the industry in California in its earlier stages. The development of the sugar industry in the intermountain States has curtailed to some extent the territory originally supplied by California. The annexation of Hawaii to the

United States has also had a tendency to bring more of the sugar manufactured there to our western shore. Consequently the development of the sugar industry in the State has not proceeded so rapidly in recent years.

In California the beet-sugar industry has developed on somewhat broader lines than elsewhere in the United States. Like other agricultural and horticultural industries it has received the united support and loyal sympathy of all the people of the State. These people were early accustomed to seeing things run in a large way. The State had immense forests, which were soon denuded by large lumbering companies; mining was conducted on an extensive scale; large ranches were in vogue, containing from 5,000 to 20,000 acres each. These were first utilized as sheep, cattle, and horse ranches; finally, many of them were plowed up and sown to grain. It was not uncommon to see fields of thousands of acres harvested with immense reapers and the grain thrashed and sacked in the fields as it was harvested. Even to-day the same methods obtain to a greater or less extent.

The introduction of intensive agriculture had a tendency to cut down these large holdings and substitute smaller. It was possible for capitalists in combination to purchase these large tracts and cut them up into smaller holdings better adapted to intensive uses, such as growing fruit, potatoes, beans, and the like. Then came the establishment of the sugar factory and the growing of sugar beets. Sugar production and fruit production have been mutually helpful. There has been a very rapid development in fruit production in California and the intermountain States, which has occasioned a constantly growing demand for sugar for use in fruit preserving.

The rainfall of California was sufficient for the system of agriculture prevalent in early days. With the advent of such industries as the growing of fruits and sugar beets more water became necessary. This encouraged the building of irrigation ditches, supplied by tapping the running streams, and later by reservoirs, built for storing water for summer supply, and finally the sinking of artesian wells to secure additional supplies of water. Through irrigation the State has increased her arable lands and developed resources for future extension.

A number of new sugar-beet projects have been under contemplation in the State for some time, one of which has received considerable attention during the past year.

There are many beautiful, fertile valleys in the State of California, some of which have reached a higher state of agricultural development than others. The process of evolution, as already indicated, has been from large ranches used in grazing sheep, cattle, and horses, to grain fields and, finally, to the smaller farms growing fruits, vegetables, sugar beets, and the like, the last stage of development generally involving the use of irrigation.

Probably one of the most admired of all great valleys of California is the Sacramento. The Sacramento River has its source in Modoc County, in the northeastern corner of the State. It drains the great valley bounded by the Sierras on the east and the Coast Range on the west, which extends through the upper third of the State. This valley has been the subject of constant investigation ever since the sugar industry started in the State. Its great productive grain fields, stretching on either side of the banks of the Sacramento, have been a constant source of interest to those contemplating intensive agriculture.

The Sacramento Valley Development Association is one of the most active bodies in the State interested in the development of its resources. This association is constantly studying the resources of this valley, sending out literature, exhibiting its products, and attracting capital to the development of its many resources. During the past year it installed at the Louisiana Purchase Exposition an extensive exhibit of the resources of the valley, and it constantly maintains such an exhibit at Los Angeles and San Francisco.

Through its efforts many places are suggested as adapted to the production of sugar beets and the establishment of beet-sugar factories. Chico, Marysville, Jacinto, and Colusa are contemplating such projects.

COLUSA.—Among those interested in the establishment of sugar factories in this valley is Mr. G. S. Dyer, of Alvarado, Cal., who grew up in the sugar business. He started in the old Alvarado factory, under the management of his father, many years ago. He has superintended several sugar factories in different parts of the United States and Canada at different times. Associated with other gentlemen, Mr. Dyer has been giving the resources of this great valley careful study during the past summer. This study has resulted in the determination to build at Colusa. The company organized is known as the Colusa Sugar Company, capitalized for $500,000. Stock has been subscribed, contracts made with the farmers, and every arrangement made to establish a sugar factory at this place this year to be in operation for the campaign of 1905.

W. A. Beard, secretary of the Sacramento Valley Development Association, in his report to that body in September, had the following to say touching the conditions of the Sacramento Valley and the proposition for the beet-sugar factory at Colusa:

BEET-SUGAR FACTORY.

In the matter of the proposed beet-sugar factory at Colusa, I am able to report that a strenuous effort is being made to bring the matter to a successful conclusion. There are very considerable difficulties to be surmounted, but we hope for success.

Before coming to Colusa to take up the matter of acreage contracts, which I have done as authorized at the last meeting, I visited four of the seven beet-sugar districts of this State. Without going into detail, I will state that I returned from this trip fully satisfied that sugar beets will do well in the Sacramento Valley and prove a crop of very great value. I found sugar-beet land valued at from $125 to $300 per acre. I found that renters who secure crops of from 10 to 18 tons to the acre pay one-fourth rent, giving a return to the land owner fully justifying these valuations. I met men who have become well-to-do growing sugar beets on rented land; and from bankers and business men I secured expressions fully warranting the conclusion that sugar beets are a good crop. The importance and value of the introduction of this crop into the Sacramento Valley will certainly warrant the most strenuous effort on our part to assist the people of Colusa in securing the proposed beet-sugar factory, and I trust the work being done by myself as your representative will meet your approval.

OTHER INDUSTRIAL ENTERPRISES.

In this connection I will say that I believe our association can perform a very great service to the Sacramento Valley by aiding in establishing enterprises of the larger kind, thereby providing markets at home for the products of farm, orchard, and mine, providing employment for workers and adding to the general prosperity. New enterprises that are springing up in the Sacramento Valley and watershed are among the most encouraging signs of the time.

Chief among these, and most far-reaching in importance, are the irrigation enterprises that are just now attracting widespread attention—the central irrigation canal in Glenn and Colusa counties, the Butte County canal in Butte and Sutter counties, and the new irrigation system in Yolo County. Two beet-sugar factories and numerous small enterprises are in contemplation. In the mountain districts mineral deposits other than gold are attracting greater notice than ever before. Asbestos has lately been shipped from an Eldorado County mine.

Gridley, in Butte County, and Winters, in Yolo County, are planning big demonstrations, the former in honor of the beginning of the work on the Butte County canal, the latter in honor of the completion of the Yolo consolidated ditch.

COLORADO.

For rapid thorough development of the beet-sugar industry Colorado takes first rank. Beets are grown almost entirely by the aid of irrigation. Although more or less rain falls during the growing season, whatever additional moisture is required is furnished in this way. In this State can be found more advantages for growing sugar beets than in any other in the Union. These generally favorable conditions have redounded greatly to the quick and successful development of the sugar industry. At the same time the new industry has done much for the general advancement of the other industries of the State.

Colorado has greatly developed storage systems upon which further extension of irrigation must depend. Prior to the advent of the sugar industry irrigation was mostly supplied from running streams. Throughout its whole expanse the State has superior qualities of soil adapted to growing sugar beets. Given sufficient water, it can produce more beets to the acre, and of better quality, than any other. Where the beets are properly cultivated and irrigated a tonnage of

12 to 25 tons is readily secured. In European countries, where methods of cultivation have reached their highest development, an average of 14 per cent sugar in the beet and 13 tons of beets to the acre are the maximum figures. The factory districts of Colorado, with their short experience, have attained a higher tonnage per acre, and produce beets averaging from 15 to 17½ per cent of sugar.

There are many mining districts in the State, interspersed with rich agricultural valleys. These mining districts form the nuclei for municipal organization and development. The valleys are watered by irrigation, reclaimed by cultivation, and made resourceful in crop production. Formerly they were used largely for grazing. Rapidly they have become more useful in intensive agriculture. The agricultural valley and the mine are to an extent complements of each other. The mines and smelters accumulate capital, build up the towns, and develop commercial advantages; the beet husbandry intensifies the agriculture of the valleys, builds railroads, trolley lines, and irrigation ditches, and feeds the community at large. Other incidental advantages follow, induced by more dense population in the valleys.

Colorado has many laborers delving in the strata of the earth extracting Nature's deposits, and many others sweltering in the smelters, refining these metals for general use. The cost of living of both of these classes was originally high, because supplied by neighboring States farther east. They now look to their own valleys for sustenance. They have supplanted the wild horse and the grazing steer. The sugar-beet industry is the central factor in making possible this great advance—a fact clearly demonstrated and recognized by all interests in Colorado.

As evidence of the public recognition of the importance and rapidity of development of the sugar industry in Colorado, I insert here a clipping from the Colorado Springs Gazette of November 26, 1904, which is as follows:

> The beet-sugar season now under way promises to be the most profitable since the beginning of the industry in this State. The farmers and factory workers will receive more money for their product and labor, and the quality of sugar is said to be superior to that of any other season.
>
> The running expenses of the six factories in the northern part of the State will be $50,000 a day, or $5,000,000 for the season of one hundred days. It is estimated that 300,000 tons of beets will be handled, which will yield 77,000,000 pounds of sugar. These figures pertain only to the factories in the northern part of the State. Those in the southern district, being fewer in number, have a smaller capacity, but it is believed that they will pay out about $2,000,000 more, making a total of $7,000,000 which the farmers and factory workers of Colorado will receive this season for the sugar-beet harvest.
>
> The rapid growth of the beet-sugar industry in Colorado is one of the most remarkable developments in the agricultural life of the West. It is only about six years since the first factory was built, but the value of the output has grown from nothing to $7,000,000 last year, and it will probably be considerably greater this season. The

soil and climate of the eastern half of the State seem to be peculiarly adapted to the culture of sugar beets, and it is an established fact that the percentage of saccharine matter contained in Colorado beets is greater than in those raised in other sections of the country.

The yield to the acre being larger than that of any cereal, makes it possible for the farmer to cultivate a small farm with greater profit than he could a larger tract devoted to wheat, corn, or oats. This necessitates more thorough cultivation, and also provides opportunity for a larger and more prosperous population to the square mile. Irrigated sugar-beet farms may yet transform eastern Colorado into one of the most densely populated agricultural regions in the country.

Throughout my reports I have often called attention, where the lands are sufficiently watered, to the extensive agricultural resources of Colorado; also to the adaptability of the sugar industry as a means of developing the more arid portions. Its demands are extensive. It must necessarily capitalize on a large scale if it employs facilities, such as irrigation, transportation, etc., necessary for its successful operation.

I have always insisted that the sugar beets require good companionship, succeeding best where conditions favor a varied agriculture. This crop gives the best results with average farmers when grown in rotation, and on small fields rather than large. Their intense cultivation leads to improvement of the soil both in fertility and mechanically.

In agriculture Colorado began with grazing. She has gradually developed the production of alfalfa, small grains, potatoes, fruits, and melons. There has been a remarkable increase in these things, due to growing sugar beets, as well as a stimulation to a wonderful extent of cattle feeding, breeding, and dairying. We see daily in the public press extensive reports from sugar-factory districts concerning the installation of these new industries.

The recognition given to these things in our public press is suggestive of their importance. Some of the best newspaper writers in the country conduct investigations of these things, and give "write-ups" of their observations. As an evidence of the influence of the sugar industry and the magnitude of the same, I insert the following from that veteran newspaper reporter, William E. Curtis. This article resulted from a careful study of conditions in the beet fields of Colorado, and was published in the Chicago Record-Herald, November 24, 1904:

OPERATIONS ON A LARGE SCALE.

Last season (1903) the Rockyford factory paid more than $600,000 for beets to the farmers in the neighborhood, 110,000 tons being brought in by rail and about 20,000 tons by wagon. Its freight bill to the Santa Fe Railway alone was more than $100,000, as it buys the beets at the track and pays the expense of handling them. The business has grown so large that the railway company has built elevated tracks and chutes, similar to those used for handling coal, at every station and at other convenient places. Now the farmer has only to drive his team up an incline to a platform and pull out the end board of his wagon, so that the beets may slide down into a coal car.

Last year the Rockyford company shipped about 300,000 bags of sugar, each weighing about 100 pounds. It is all bought by the sugar trust, and the prices are regulated in New York.

Everything connected with beet farming can be done by machinery except weeding and thinning the plants and picking up the beets. The seed is sown with a seeder; the weeds between the rows are kept down and the soil is kept loose by cultivators; the beets are dug by horsepower; but so far human ingenuity has not been able to provide any device for weeding among the plants or thinning them out where they are too thick. That has to be done by the hands of human beings on their knees, and it is the great drawback to the industry. The independent American citizen will not spend the day on his knees, and he will not allow his wife or daughter to do so; hence there is great difficulty in getting anybody to do this back-breaking work. About 600 Mexican and Indian men and women are brought up from the pueblos of New Mexico every year. They come from as far away as El Paso and Gallup in weeding time, bringing their women and children, and stay until after the cantaloupes are picked and shipped, about two months altogether, and are paid from $5.25 to $7.50 an acre for weeding and thinning beets. A Pueblo Indian or half-breed Mexican, with his wife and children, can do from one to three acres a day, according to the size of the family and their industry. The sugar company sends out agents in the spring to gather them up, pays their railway fares, and provides quarters for them to live in.

IMMENSE IRRIGATION SYSTEM.

Behind the Rockyford factory is one of the biggest irrigating systems in the United States, owned by the Arkansas Valley Sugar-Beet and Irrigated Land Company, composed of H. B. Hyde, of the Equitable Life Insurance Company, the Mercantile Trust Company of New York, the Oxnard Brothers, and other eastern capitalists. It has 14,000 acres of reservoirs, 350 miles of main canal and 750 miles of laterals, covering an area of about 120,000 acres, which the company has purchased in small tracts from the railway, the State, and from tired farmers who tried to farm with rain and failed. There are now about 70,000 acres under water, and 25,000 acres more can be reached by the extension of this system.

The next largest plant is the Fort Lyon system, immediately west, which was organized by T. C. Henry, of Kansas, and sold to the farmers after all the land was disposed of. It has about 60,000 acres, watered by 113 miles of canals, divided among about 360 farmers.

The largest irrigated area in one location is on the Platte River, in northern Colorado, but it is operated by a number of independent companies.

The man who started the Arkansas Valley irrigation system made a failure of it, and the property came into the hands of the present owners unwillingly by foreclosure. They had to put in more money to save their investment, and have continued to do so during the last six years, until they have invested several millions in land, ditches, and improvements. They have sold about 30,000 acres, all the way from $40 to $180 an acre, according to location, and that is a big price for raw land with no improvements except water. The lowest price of raw land is $40 an acre; the lowest price at which cultivated land has been sold lately is $60 an acre. Every acre has to pay 50 cents a year for water. * * *

EFFECT OF IRRIGATION.

With irrigation, 40 acres will produce as much as any ordinary 160-acre farm without, and, indeed, the company insists that nobody can profitably handle any larger tract. It will not sell more than 40 acres to any one buyer. There are now about

250 farms within the irrigated district. The largest, 320 acres, belongs to J. C. Moss, who was one of the earliest buyers, and got his land before the property passed into the hands of the present owners. The Salvation Army has 1,700 acres at a town called Amity, upon which it has located a colony of about 400 people. Two other towns, Holly and Granada, are dependent on the company for water.

There is room enough on the irrigated area for a thousand farms and a general population of 10,000 or 12,000. Any staple will grow. Sugar beets are the surest and most profitable, all things considered, and will pay anywhere from $25 to $125 an acre, according to the skill and industry with which they are cultivated. Cantaloupes will pay more, often as high as $250 an acre, but they are a speculative crop and often uncertain in quantity, price, and market. Alfalfa will average better than cantaloupes year in and year out, according to the testimony of the farmers. It is always in demand in Texas, Oklahoma, New Mexico, and Arizona at profitable prices, and requires less labor than any other staple. Apples, peaches, and other fruit pay well, but require five and six years to reach the bearing age. There is a steady profitable market for all kinds of vegetables, and a wise farmer divides his interests and avoids the error of carrying all of his eggs in one basket. He will have a truck garden, an orchard, four or five acres of melons, and give the rest of his land up to alfalfa and beets.

A number of places in Colorado are on the eve of installing sugar factories. Some of them will be in operation during the campaign of 1905, others in 1906. Those with plans more definitely arranged are the following:

BRUSH.—Brush is located near the Platte River, on the Burlington and Missouri River Railroad, and also near the Union Pacific, which runs on the north side of the river at this point. It is about half way between Denver and the eastern boundary of the State, and in a practically new irrigated district. It has shown quite favorable results in producing the usual crops of that part of the State. Its proximity to the factory at Greeley and others in that section has afforded it the opportunity of growing beets for several years. Through this practical method its conditions have been thoroughly investigated, and sooner or later it is quite probable that a sugar factory will be constructed there.

This place was under investigation by two or three different sets of capitalists during the past summer. Its location has been favorable to growing sugar beets for other factories, thus demonstrating its advantages; but this fact has not tended to the immediate establishment of a factory. As in all other factory districts where there are several factories contending for a supply of beets, it takes time to work up the supply of beets to the capacity of all. A location in a competitive district of this kind must bide its time until existing factories are assured of a permanent supply in their own immediate vicinities. Investors may then feel justified in installing an additional factory.

Keeping in touch with the progress and development of such places, I wrote Mr. A. J. Morey, agricultural superintendent of this district, for the latest information up to date, and received the following reply:

BRUSH, COLO., *December 26, 1904.*

DEAR SIR: In answer to your request, I submit a few facts concerning the sugar-beet industry in this part of the State.

In the spring of 1903 there were planted about 1,100 acres of beets in this county (Morgan). The season proved very dry and backward, and we only harvested about 7 tons per acre. The farmers, as a consequence, were discouraged, and it was with difficulty that I managed to contract with the farmers for 300 acres for 1904. The season proved good, with plenty of moisture, and we harvested a crop that averaged 14 tons per acre; 30 tons per acre was the heaviest. Our tonnage was considerably less than it would have been owing to the advent of the tent worm, which made its appearance the last of July and which damaged some fields fully 50 per cent.

The outlook here was exceedingly bright for a large acreage for 1906, and also for a sugar factory here for 1906. The sugar contained in our Colorado beets runs from 15 to 18 per cent on an average.

I hereby append the names of farmers who grew beets the past season:

Brush post-office: A. H. Delpke, D. W. McSween, Nels Christensen, James L. Peterson, H. Hansen, Sam Andreason, William Fick, William Jones, L. M. Davis, C. L. Colwell, Knud Michaelson, R. Madsen, Fred Rasmusson, Nels C. Christensen, J. A. Aspinwall, J. C. Joppa, W. C. Burchstead.

Hillrose post-office: W. W. Sickles, G. W. Sheldon, Jeno Bach, Claus Seviers, Peter Petersen, Fred Wahlert, W. S. Stratton.

Yours, truly,

A. J. MOREY, *Superintendent of District.*

CRAIG.—Noticing considerable comment in the public press with reference to Craig's agitation of the beet-sugar industry, I wrote Mr. J. R. Kilpatrick of that place and from him received the following report:

CRAIG, COLO., *January 2, 1905.*

DEAR SIR: Replying to yours of the 31st ultimo, I will say that as yet very few beets have been raised here, and the data you ask for I am unable to give you. While I have seen some very fine beets here, they are only raised for feed, there being no factory here as yet. Some have been tested, and I am told there is only one place in the State where they test higher. When a railroad reaches here and we complete our canal project we are assured a factory, and no doubt beets will be raised on a large scale.

I have 100 pounds of German beet seed for distribution and will furnish them free to all who care to experiment, so that next year I can give you the desired information.

Very truly, J. R. KILPATRICK.

JULESBURG.—This town is situated in Sedgwick, the northeastern county of Colorado, on the line of the Union Pacific Railroad, and is quite a lively railroad point. Its agricultural district is penetrated by three irrigation systems, viz, the Peterson, the Settlers, and the South Reservation. It has about 40,000 acres available for agricultural production. A liberal supply of beets can be drawn also from the irrigated district in the State of Nebraska, just east and contiguous to it.

For some time this town has been receiving considerable attention from various parties interested, who are studying its resources and adaptability to beet-sugar production.

There is in process of erection, to accommodate the water supply of this place, a reservoir holding 1,200,000,000 cubic feet of water. When this is completed, the place will possess all the requisites for facilitating the wants of a sugar factory. During the past summer parties interested made a proposition to build a sugar factory at this place, to be in operation in 1905, provided the farmers of the community would contract to grow sufficient beets to maintain it. Conditions in this locality for growing sugar beets have been pretty thoroughly tested. Beets have been grown for factories in the western part of the State. In 1903, 700 tons of beets were produced in this vicinity. Of these 550 tons were shipped to Eaton, Colo., and 150 tons to Grand Island, Nebr. The best field of beets of 3 acres or over produced an average of 12 tons per acre, and tested in sugar content 18.2 per cent. The estimate of cost of producing these beets was $30 per acre. It seems probable that a factory will be erected in the near future.

Mr. Mark Burke of this place has taken an active interest in locating a sugar factory at this place, growing sugar beets, and encouraging the industry. In response to my inquiry he makes the following report touching the results of beet growing, prospects for a factory, and the general development of the facilities incident thereto:

> JULESBURG, COLO.
>
> DEAR SIR: We have only been experimenting two years, and on a very small scale, but results were so satisfactory that farmers are almost unanimous in declaring sugar beets the most profitable crop at present price ($5 per ton f. o. b. Julesburg); but we understand the price is to be cut 50 cents per ton, and, if that is the case, no more beets will be raised here until we get a factory. Our beets yielded from 8 to 18 tons per acre, and when we sold by the "sliding scale," i. e., $4 per ton for beets testing 14 per cent and 25 cents per ton for each 1 per cent above that, they averaged 18.2 per cent. We have 40,000 acres of good beet land tributary to this town, and are now building a large storage reservoir, with a capacity of 1,200,000,000 cubic feet, at a cost of $300,000.
>
> Respectfully, yours,
>
> MARK BURKE.

LAMAR.—This town is situated in Prowers County, on the Arkansas River, in the eastern part of the State, one county removed west of the Kansas line. For several years beets have been grown extensively in this locality for the factory at Rockyford, the property of the American Beet Sugar Company. Beet growing for this factory has also been carried on extensively in Kansas, east of Lamar, on the Arkansas River. Both of these districts produce high-grade beets. In comparison with other things the crop has also proven very remunerative to the farmers. The factory at Rockyford has now established a permanent supply nearer home. The company recently decided to construct a plant at Lamar. This Lamar plant will be about 100 miles east of Rockyford. It will probably absorb the supply of beets grown in Kansas, which will bring the Kansas district 100 miles nearer the factory buying its beets.

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The machinery for the factory at Lamar is to be removed from Norfolk, Nebr., where it has been in operation for the past fourteen years. It is the plan of the company to improve and enlarge it when installed at Lamar. In conformity with the regular plan of this company, it has purchased a large tract of land in the vicinity, which this sugar factory will develop agriculturally. Foundations and buildings are now being constructed at Lamar, and the dismantling and forwarding of the machinery is proceeding at Norfolk. The factory will be in active operation in 1905.

When the agricultural district at Lamar has fully developed, so as to produce beets to the capacity of the factory, a sufficient start will have been made on the Arkansas River in Kansas to build a factory at some desirable place there.

STERLING.—For some years Sterling has been practically demonstrating conditions favorable to a beet-sugar factory by growing beets more or less commercially for other factories.

In 1903, 2,300 acres of beets were raised in Logan County, in the vicinity of Sterling. All of these were irrigated by water from the South Platte River. The beets were grown under contract for the factory at Eaton, Colo., and averaged 16 per cent sugar; many of them as high as 18 per cent. The average tonnage was about 8 tons per acre; one 15-acre field yielded 20 tons to the acre. The average cost of production per acre is $37.50. Another 10-acre tract yielded 15 tons per acre. This was on bottom lands, and the cost of production was $35 per acre. One 80-acre tract planted to beets by the Sterling Beet Growers' Association averaged 10 tons per acre. It had never been cultivated before. It had been in alfalfa, sown on the sod, the stubble of which was broken by a steam plow. The cost of production of beets on this ground was $45 per acre.

Many of our present factories would be pleased to receive the beets from 2,300 acres, the acreage grown in this vicinity without the stimulus of a sugar factory. This is a very good showing for a farming community new in the business. It carries with it considerable assurance to those establishing a sugar factory to operate in this place in the future.

Sterling is situated in Logan County, on the South Platte River, at the junction of the Denver and Rio Grande and the Union Pacific. Its availability in sugar production has been under consideration by many different parties for the last two years. Several times the establishment of a factory seemed assured.

In order to obtain the latest and most definite information touching beet growing for 1904 and arrangements for installing a sugar factory, I sent a letter of inquiry to Mr. C. B. Goddard, president of the Beet Growers' Association of this place, who forwarded the following report:

STERLING, COLO., *December 24, 1904.*

DEAR SIR: Your communication regarding sugar beets at hand. While our country has passed the stage of experiments, I will gladly give you our report.

We grow beets entirely under irrigation; we raised in 1904 1,000 acres. They averaged 13 tons per acre with an average of 16 per cent of sugar. The beets at $5 per ton made $65 per acre, an average profit of $30 per acre.

We now have contracted for the 1905, 1906, and 1907 crops 4,000 acres of beets, and have a contract for the construction of a sugar factory to begin building May 1, 1905, the factory to be built by the Havemeyer interests.

Our irrigated lands are among the best in Colorado, and eastern farmers are moving into our country very rapidly. The South Platte Valley will grow about 8,000 acres of beets for the 1905 crop.

Any further information will be cheerfully given.

During 1903 a delegation (about forty in number) of German agricultural experts visited this country, consisting of the most scientific representatives of that Empire. It made an extensive tour and a study of our agricultural resources and conditions. The members were especially attracted to our sugar districts. Some of them have revisited this country seeking lines of investment appealing to them on their former trip. This inspired other German investors to investigate in conjunction with some of this original delegation. For beet growing that part of Colorado covered by the Platte attracted considerable attention. These gentlemen had in view the establishment of several sugar plants along its course from Denver to the eastern boundary of the State. Sterling itself received the special attention of these foreigners.

The company of Colorado capitalists controlling the six large sugar factories in the north part of the State, headed by C. S. Morey and Charles Boettcher, of Denver, finally organized the Sterling Sugar Company, which will build a factory at this place, to be in operation for 1905. By the articles of incorporation the company is to operate in Logan, Sedgwick, Phillips, Washington, Weld, and Adams counties, and the city and county of Denver. It will be thus seen that these include most of the territory tributary to the South Platte. The company is capitalized for $1,500,000, and probably contemplates building sugar factories at all the points that have been under investigation the same as Sterling, such as Julesburg, Brush, Fort Morgan, and other places mentioned in these reports from time to time. The conditions around Sterling have been tested; beets have been grown quite extensively for the factory at Greeley and for other factories in that vicinity.

HOLLY.—It has been definitely settled that a beet-sugar factory of 800 tons daily capacity is to be erected at Holly, Colo. This factory will be constructed and equipped during the present summer. The beets for its first campaign will be grown during this season, and it is to be in operation this fall. The Arkansas Valley Sugar Beet and

Irrigated Land Company is building the factory. Its inception is largely due to the efforts of the manager of the company, Mr. W. H. Wiley.

IDAHO.

For several years the State of Idaho has been under careful investigation. Conditions favorable to the beet-sugar industry at many places have been clearly demonstrated. As in the other Mountain States irrigation is necessary; but the irrigation facilities, in comparison with the crop possibilities of the State, are slightly developed. As a rule the irrigation ditch must precede the sugar factory. The business energy of the State has been exerted in securing capital for developing its mines. To secure capital to the extent of installing a sugar factory and irrigation systems was a difficult problem.

While there is water in abundance coursing through the running streams of Idaho, its utilization presents difficult engineering problems. For instance, the Snake River crosses the southern part of the State from east to west, and continues north forming nearly half of its western boundary. Throughout its length peculiar shore formations occur. These are mostly of solid rock, high and steep. The valleys are more or less removed from the stream, sometimes cut off by hills and mountains. The problem has been to get this water out over these high rocky shores and into the valleys. Many projects contemplate tunneling under mountains to secure water for irrigation. Many beautiful valleys and stretches of land in the State remain unwatered and unimproved on account of this situation.

The State possesses in a high degree those peculiar conditions of soil, atmosphere, and sunshine so necessary to the production of beets of high quality. Sugar beets, like other root crops, thrive best when the sun is not too hot and wilting, and yet the sun is one of the strongest factors or reagents in elaborating the sugar in the beets. In this State we have many cloudless days of gentle, even temperature, especially helpful in growing and ripening the crop. The peculiarities of this climate are not favorable to sugar beets alone, but also to fruits. Apples are of large proportions, excellent quality and color, and fine texture.

The State has been a little slow in the development of her agricultural and horticultural resources, purely from lack of capital. Such capital as has previously reached the State has been diverted into her mining enterprises.

During the last two years three sugar factories were installed—at Sugar City, Idaho Falls, and Blackfoot, all on the Snake River. The accomplishments of these factory districts are advertising to the world the vast agricultural resources of the State. The sugar factory, when once introduced, is a concern of sufficient influence to attract capital. It installs machinery, buys large tracts of land, builds irrigation ditches and reservoirs and local transportation lines, both steam and electric.

It is not possible to devote to sugar beets all the arable territory brought under cultivation. To install an irrigation ditch having an abundant supply of water means the reclamation of a large body of land. To employ this land to the limit of its availability leads to the growing of all other crops indigenous to the section. With the establishment of the factory and the ditch, the fruit, grain, potato, and stock grower, the creamery producer, and every other person of whatever intensive farming interest, finds the fulfillment of his long pent-up designs and schemes for utilizing the fertile valleys of Idaho.

Here we see repeated the remarkable experience of Colorado, except that that State had already watered large areas of land and started diversified agricultural production to a considerable extent. The sugar industry in that State simply intensified all these. In the State of Idaho the beet-sugar industry has been introduced in association with the other industries. All thrive better under the stimulus of the factory.

Idaho has also some of the conditions which favored the industry in Utah. It is estimated that at least one-third of the farmers of Idaho are Mormons. In previous reports I have reviewed the special training of these people, accustomed to the closest kind of intensive production on small plats of land, making the most out of little. The system and oversight pervading the operations of this sect, as shown in the wonderful accomplishments of Utah, augur much in their application in developing the agricultural resources of Idaho. They are especially favorable to the beet-sugar industry and adaptable to the desert and its reclamation through irrigation and intense cultivation.

CALDWELL.—For some time there has been careful study given to what is known as Boise Valley, in the western part of the State. This valley is tributary to Snake River and is the seat of the capital of the State. It is supplied with better transportation facilities than any other portion of the State. In it are located several live towns, among which are Caldwell, Boise, and Nampa.

Experiments in growing beets have been conducted from year to year through various agencies. These have always resulted in the production of good beets of high sugar and purity in the valley. It probably has more natural factory facilities than any other part of the State. From several sources negotiations have proceeded with local business interests with a view to establishing a factory at one of these places. There has been considerable rivalry among these towns as to which would secure the site. During the fall of 1904 it was quite reliably announced that an organization had been effected and a factory would be built at Caldwell. It appears that this will be an outgrowth of the sugar industry in Utah. Parties operating factories in that State are behind the proposition. It is quite evident that a factory will be located at one of these places in the near future. The location at Caldwell seems almost assured.

IOWA.

In Iowa the sugar industry experienced a lively revival of interest during the past year. To at least four places propositions to install factories were made by those interested in beet-sugar production. Throughout the past ten years different places in this State have been under investigation by many parties interested in the subject. During that period its resources have been thoroughly tested experimentally. The experiment station at Ames took a leading part. In almost every county beets have been grown and tested in its laboratories.

Through these experiments and its well-known agricultural and natural advantages it has always ranked among the leading States in this respect. For this industry the northern half of the State has been considered most available. This portion of the State seems best adapted to the industry, but the soil is generally fertile, and beet growing and field crops generally are profitable in all parts of the State. As a rule, sufficient rain falls for all crops. With beets, as with other crops, assurance of a crop year after year is the greatest requisite.

The State has developed large agricultural interests. It is probably the best balanced, agriculturally, of any State in the Union. As a rule, farmers are progressive, successful, and satisfied. In fact, this has been the main obstacle to installing the sugar industry there. The farmers have not shown a disposition to grow the beets. When the farmers are advised that beet culture is accompanied with considerable hard work, factory propositions usually succumb to the inevitable. The farming class of the State is accustomed to the use of labor-saving implements in the fields. The drift of methods has been away from hand work rather than to it. However, it may be said that Iowa possesses in a strong degree all the requisites for maintaining the industry when once it is installed. She has the quality of soil and climatic conditions necessary for producing a large tonnage of beets. Experiments throughout the State have indicated that the beets are satisfactory in sugar content and purity.

There are many railroads penetrating the State in every direction, many trolley lines cutting across the farming districts, and many new ones projected. While there are but few large cities there are many prosperous, active smaller ones.

Throughout the central part of the State, from north to south, coal is found in abundance. It would be almost impossible to locate a factory in Iowa not convenient to a coal supply.

The general live-stock interests of the State are greater than those of any other in the Union. Especially extensive are those of feeding and breeding. The creamery and dairy production of the State approximate an annual value of $40,000,000. In the State are already developed to a remarkable degree all the facilities and resources needed by the beet-sugar industry, as well as the other industries which would benefit by its establishment. To the industry itself these would contribute at once those influences most conducive to its highest success. To a considerable extent beets have been grown in several places for factories in other States near her borders. To the factories receiving them they have always been satisfactory.

For climatic reasons the beets grown in Iowa have not been as high in quality as those grown in California, Colorado, or Idaho. However, they are of a quality entirely satisfactory, and they can be produced at a cost lower by 25 per cent. The strong point of Iowa beets is the surety of the crop. Beets of high quality are very desirable; so is a good yield. Beets may be high in quality and at the same time the yield may be light and not remunerative to the grower. A factory desires, more than anything else, a permanent, constant supply of average beets. A factory can better afford to work on a full supply of average quality beets than on a half supply of high-grade beets. Given sufficient tonnage to pay the cost of production and a fair profit and we have encouragement for the farmer. As in any other business, profit in farming is the one thing that stimulates the production of any particular crop. The management of every factory fully appreciates that the profits of the beet growers are the guaranties of the factory's continuance.

In connection with this industry the Iowa farmer has failed to fully understand a few things. In considering it he has riveted his attention on the laborious work of growing the crop. Some day he will discover that the beet crop will enable him to employ and pay labor, and will yield a good profit besides, and that he need not work harder than in producing other crops. He will discover that it improves his land, both mechanically and in fertility; that he can sustain more live stock, and that he can sell or rent his land for more than he otherwise could.

The places under consideration during the past year were Des Moines, Clinton, Waterloo, and Davenport. Parties owning two factories in Michigan, owing to an oversupply of factories and a consequent scarcity of the beets there, proposed moving them to new places. Negotiations were opened in Iowa with a view to establishing these plants at some of the places named.

DES MOINES.—Around Des Moines beets have been grown experimentally for several seasons. It has been established beyond a doubt that good beets can be produced in the locality. The city is quite a manufacturing center, and to a considerable extent is a local distributor of sugar to other points. The subject of establishing a beet-sugar factory has been before the business interests of the city many times. On several occasions it seemed sure that a plant would be established here, but for various reasons these considerations have failed of final fruition. The commercial exchange took considerable interest in this proposition from Michigan, several meetings were held, but nothing was accomplished.

CLINTON AND WATERLOO.—The proposition followed practically the same course in Clinton and Waterloo. From an agricultural standpoint Waterloo is one of the best locations in the State. Here the farming district has a quality of soil especially adapted to sugar-beet culture. The consideration of this question has been up so many times before the business men of these various places, and interest has waned, that it seems impossible to crystallize anything tangible in the present instance.

The proposition made at these places was this: The plant, including all machinery and metal structure, was to be appraised at a fair value by engineers and representatives of both interests. For this the Michigan company proposed to take stock. A new company was to be organized in Iowa to subscribe the rest of the stock and to procure the money to move, install, and operate the plant. Waterloo exhibited more active interest generally than did either Clinton or Des Moines. It seems the proposition failed for the present from inability to raise the money required.

DAVENPORT.—In Davenport the proposition met with a much more hearty support. The commercial club of that city took it under active consideration; a committee was appointed to go to Michigan, examine one of the plants, and negotiate with the owners for its removal. Several meetings were held by the business men of the city; finally sufficient capital was raised and the company was organized; committees were appointed to secure contracts with the farmers, with the result that Iowa secures a beet-sugar plant to be installed in Davenport for the campaign of 1905.

For the introduction of this industry into Iowa it was probably fortunate that Davenport should be the place selected. The city has many seperior advantages. (1) It has abundance of capital to carry forward an enterprise of this kind; (2) it has river transportation for bringing in crude materials and shipping out the finished product; (3) its business men are energetic, successful, and progressive; (4) from it radiate railroads connecting with others penetrating every part of the States of Iowa, Illinois, and Missouri; (5) it is a wholesale distributing point of considerable pretense; (6) it has cheap fuel; (7) in its vicinity are large dairies and creameries; (8) the industry is admirably adapted to its community, which is largely of the German extraction, accustomed to intensive farming on small plats and gardening in general; (9) it is one of the largest manufacturing points in the State of Iowa, and its industrial concerns are generally successful. It is sure to succeed in the beet-sugar industry.

In the Iowa Daily Capital, January 3, appeared the following terse description of this plant and its organization:

> The articles of incorporation of the Davenport Sugar Company were signed Saturday by Melzar J. Eagal, Bruce T. Seaman, Albert L. Mossman, Martin H. Mueller, John B. Phillips, Ambrose P. McGuirk, and Adolph H. Stoltenberg. Melzar J. Eagal was elected president, and M. H. Mueller secretary. The capital stock of the company is $600,000, and it is expected to put into circulation from $750,000 to $1,000,000 during the coming year.
>
> It will be necessary to begin the construction of this enormous plant not later than April 1, 1905. The main building will be 400 feet long by 80 feet wide and 5 stories high, being wholly of steel, cement, and brick, absolutely fireproof. The boiler-room will be 250 feet long, 75 feet wide, and 4 stories high; the lime house 200 feet long, 75 feet wide, and 4 stories high. The machine shop will be 60 feet by 50 feet. The beet-storage house will be 400 feet long and 150 feet wide. The sugar store and ware house will be 200 feet long by 75 feet wide, and 2 stories high. The office will be a two-story building, 40 by 60 feet. It will require from April 1 to October 15, 1905, for between 350 and 400 mechanics and laborers to construct the buildings and install the machinery. To supply this plant it will require 5,000 acres of sugar beets, which it is expected will produce 25,000,000 pounds of sugar annually. To operate the plant will require 350 men. The pay roll per month will be approximately $21,000. The factory will consume 100 tons of coal per day.

IOWA CITY.—During December, 1904, Iowa City took up the matter of installing a sugar factory. The same Michigan parties who conferred with the business interests of Waterloo, Clinton, Des Moines, and Davenport, tendered the Commercial Club of Iowa City the same proposition to move a plant to that point.

President Coast and Secretary Devorsky, of the club, have been authorized to confer with the sugar company on the subject. Business interests generally are actively considering the subject and investigating the possibilities of securing sufficient beets in the immediate vicinity.

MARSHALLTOWN.—For years a glucose plant has been in operation at this place. Recently the management of the concern has been giving special investigation to its farming territory, with a view to changing from a glucose to a beet-sugar factory. Considerable interest is taken in this enterprise by the business men and farmers in its vicinity. There are strong probabilities that this change will occur, and in the near future a beet-sugar factory will be in operation.

ILLINOIS.

Through the State Experiment Station at Champaign, this State has been tested exhaustively for conditions favorable to the beet-sugar industry. Its commercial facilities are strategic. It has a network of railroads connecting its commercial centers and ramifying through its agricultural districts in every direction.

It is bounded on the west by the Mississippi River, affording water transportation on its western border for crude material and finished products. Its soil, which is adapted to field crops of all kinds, has shown favorable results generally for growing sugar beets. The northern half of the State is considered quite favorably adapted to the sugar industry. Its proximity to the great distributing market of Chicago, both by rail and lake, are especially favorable. Gardening, dairying, stock production of all kinds, and every kind of intensive agriculture adapted to the section is highly developed.

It has all the natural and commercial facilities necessary for successful beet-sugar production. It has probably considered, at different times, as many projects for the establishment of factories as any other State in the Union. Up to date none of these have been consummated, except that in 1899 a factory of 500 tons capacity was built at Pekin. This place is in the western part of Taswell County, on the Illinois River, near Peoria. The season was quite abnormal for all crops. This, with the other difficulties of a first year's experience of the farmers in growing beets, resulted in poor beet crops. The district is especially interested in whisky and glucose production. After the first years' experience the farmers showed a disinclination to beet growing, and the factory was dismantled and the building used for one of these other industries.

The projects that have received attention for the last three years and seem most probable of consummation are these contemplated near the city of Chicago itself. For some time particular interests in Chicago, especially wholesale grocers, have been considering the erection of a plant somewhere in the suburbs of the city. Several of these proposed factories have seemed at times practically assured; but for one reason or another they have finally been abandoned.

RIVERDALE.—During the present year a distilling property at Riverdale was utilized by Mr. Charles Pope, of Chicago, for establishing a beet-sugar factory. This location is near the suburbs of the city. The buildings have been constructed and are now being fitted with machinery; contracts are being made with the farmers, and the plant will be in operation here in 1905. This project is under the control of Mr. Charles Pope, of Chicago. In order to get information as to the exact status of this enterprise, I wrote Mr. Pope and received from him the following reply:

CHICAGO, *January 12, 1905.*

DEAR SIR: In reply to yours of January 7, would say I am building a beet-sugar factory at Riverdale, Cook County, Ill., 17 miles south of Chicago, on the Illinois Central Railroad.

I have the buildings completed, all the machinery bought, and part of it installed.

It is on the property formerly occupied by a distillery, which was burned down some years ago.

I have commenced taking contracts for beets, but am not getting them as fast as I should like to; am afraid there will be difficulty in getting enough to run with. The capacity of the factory will be 350 tons per day.

Yours, very truly,

CHAS. POPE.

MICHIGAN.

Michigan has installed more factories than any other State in the Union. The first was established at Bay City for the campaign of 1898. Since that time 20 others have been built and operated; two others at Charlevoix and Mount Pleasant have been under construction a couple of years. These two concerns contracted beets for 1903 and 1904, but owing to difficulties which prevented the completion of the plants the beets have been disposed of to other factories.

In Michigan we find most of the unfortunate records chargeable to the beet-sugar industry since its inception. These were results of natural and economic causes. There was too much rush and not enough careful study of economic conditions in establishing the factories. Factory building was pushed beyond its resources. Too many plants were located in too small an area; few of them received enough beets on that account. If sufficient time had elapsed for developing the resources, Michigan could have sustained all the factories she had built. As it was, some of them led a precarious existence. Two of them have been removed from the State, the one at Benton Harbor to Canada, and the one at Kalamazoo to Chippewa Falls, Wis. Possibly two or three more may find it necessary to seek new locations.

In development the energies of the State had been largely directed to other lines than agriculture. There are few States sufficiently fortified, agriculturally, to undertake Michigan's task in the sugar industry. None could have constructed and carried to successful operation 23 factories in the short time during which it was attempted in that State. In installing so many factories under the high pressure of agitation, the business interests of the State were moving too fast.

The State has many natural advantages. Through these, and a higher development of conditions in the farming sections around these factories, most of them will eventually pull through. To sustain 23 factories large live-stock interests are needed—feeding, breeding, and dairying—also extensive diversified cropping in general and a farming class accustomed to rotation, fertilization, and intensive culture of crops. These are things of natural growth requiring long experience. They come through gradual agricultural development; they are not built up in a night, a week, a month, or a year. They come in the natural evolution of things, through a decade or a lifetime. They may be stimulated by a "shaking up," such as the sugar industry has given Michigan, through losses and consequent reverses, but even then considerable time is necessary.

You can not make a first-class farmer out of a poor one unless he is young or new in the business. As a class, in Michigan, good farmers are not the rule. You can not project the best agricultural sentiment or practice in a moment. Farming in the State at the introduction of the sugar industry was not so prominent as an industry as it was in many other States. As with mining in Colorado, this State was devoted to lumber production. This was the fixed industry, the one receiving the devoted energies and attention of the press and the united support of public sentiment. That it was waning and its end fast approaching, all felt assured. Naturally something else must be introduced to utilize the energies and capital of the people of Michigan.

Under such conditions the sugar industry appeared on the scene. The business men of the State were already organized in companies and found their business declining. The hum of the sawmills was gradually growing faint. Those still in operation were running on short supplies. The sugar industry was greeted as a great benefactor. Unfortunately its requirements were greatly underestimated.

Sugar companies were organized on short order, sites selected, and contracts arranged for growing beets and building and equipping plants. Regardless of conditions, economic or otherwise, the sugar factory was greeted as the Moses, the deliverer, of the business community of Michigan. In some places factories were located too close together. Had their resources been well developed these districts could not have furnished beets sufficient to supply these factories to their full capacity during all seasons. Michigan has favorable resources when they shall have been fully developed.

The results of all this haste and enthusiasm was confusion, jealousy, and strife. Neither factory men nor farmers had had sufficient experience to guide them through the difficulties. The results were that two factories stopped building when nearly completed, two others have removed, and two or three more will probably do so.

Many of these companies paid from $5 to $6 per ton for beets, extracted the sugar, threw the pulp away, and lost one-third of the investment in this transaction. Excessive rains and unusual droughts, occurring in this pioneer experience, added to the difficulties. Yet the history of the misfortunes developed by the sugar industry in Michigan justifies no conclusion except that there were some mistakes underlying all the work done. There is much favoring the industry in the State. Any verdict of public opinion or press, intimating failure of the industry in Michigan, is premature. We can not have a fair judgment of the sugar industry in Michigan until all the facilities have been developed, and the soil and climatic conditions have been thoroughly tested. It can be said that the situation is improving. Conditions are becoming better understood. Even the unfortunate circumstances attending its development will, in the end, be to the advantage of the industry.

Naturally there are not many new factories under consideration at the present time. The energies of the State should be devoted to the completion and operation of those factories already installed. Whatever new projects are now considered are simply the outgrowth of naturally strong causes developed by the factories operating in the State in the past.

Michigan has many advantages for the beet-sugar industry. It has lake transportation. The great market centers—Chicago, Detroit, and Buffalo—are easily accessible. The factories get the lowest freight rates on crude materials and finished products. The day will come when all these advantages will operate to develop the sugar industry in the State.

Among the places receiving attention during the past season the following may be named:

SAULT STE. MARIE.—At this place beets have been grown experimentally for the existing factories. On account of its location, as the gateway of a great commercial highway, it has received considerable attention. During the past season it has been especially under investigation. It appears that two or three different organizations are ready to construct a factory at this place whenever beet production shall have developed to such an extent as to insure a sufficient supply of beets.

As indicating the purpose of parties locally interested, and those considering this district for the installation of a sugar factory, I clip from the American Sugar Industry and Beet Sugar Gazette, Chicago, Ill., November 5, 1904, the following:

> The Michigan Investor in its last issue says: "Judge Wm. M. Snell, of Sault Ste. Marie, has received an analyses of sugar beets grown in Chippewa County, recently sent to the Sanilac Sugar Refining Company, which is of a flattering nature. The letter was written by Manager G. G. Scranton, and praises the beets highly. The beets averaged 14.3 per cent sugar, and in purity 86.1. Mr. Scranton says they are worth $5.27 per ton."
>
> Judge Snell has been one of the most energetic workers in behalf of the establishment of a beet-sugar factory at "the Soo," and as a result of the experiments this year he is greatly encouraged.

In order to get the latest developments, I communicated with Judge Snell, and received from him, under date of January 2, 1905, the following report:

SAULT STE. MARIE, *January 2, 1905.*

DEAR SIR: Replying to your valued favor of the 23d ultimo, I would say that it is impossible for me to give you a detailed statement of the results of the experimentation that has been made here in the matter of sugar-beet culture. Most of these experiments have been made in a desultory way, without reference to amount of acreage, tonnage, etc. Some years ago, believing that the climate and soil here were well adapted to the growth of the sugar beet, I ordered a supply of seed and offered prizes to be awarded at the county fairs for the best exhibit of beets. This I have continued to do each year since to keep the matter before the minds of the farmers. Three years ago I found parties who were willing to erect a factory here provided the necessary amount of acreage could be subscribed. Acting with the chamber of commerce in this city, I took the matter up, and we made an active effort to awaken interest and secure the factory. The result of the experiments at that time was turned over to the secretary of the chamber, and, as that organization has become defunct and the then secretary gone to other fields, I am unable to secure for you the figures. I can state from recollection, however, that the analysis showed a sugar content running from 12 to as high as 19 and 20 per cent; quite a number ran as high as 18 per cent. The purity I do not recollect. The tonnage, as near as we could get at it (only small amounts being grown), ran from 10 to as high in one instance as 22 tons per acre.

This year quite a number of our farmers made contracts to grow beets for the Menominee factory, which, though situated a long distance from here, took the beets, the railroads making special concessions on rates for the purpose of demonstrating what could be done. A late and wet spring prevented planting until late, and I do not think the results have been satisfactory, although I have not heard the actual results from the factory.

This year I only sent one lot out for analysis. These were in good shape and the returns from the factory showed a sugar content of 14.3 per cent of sugar, and a purity of 86.1, which was a satisfactory showing. The prospects for a factory are not very bright at present, as I was able to secure less than 1,000 acres when we made the canvass two years ago, and since that time the interest has waned, although I have endeavored to keep the matter constantly before the public.

Yours, respectfully,

WM. M. SNELL.

BLISSFIELD.—Michigan is to have another factory of 600 tons daily capacity. It is to be erected by the Lenawee Sugar Company at Blissfield. The contract for the building and equipment of the plant has been let to responsible parties, and it will be installed during the present summer. The Company has secured contracts with the farmers for 6,000 acres of beets, 3,000 acres of which, it is claimed, will be within wagon-hauling distance of the factory; the rest of the acreage is not far distant.

The officers of the new company are: David Brown, president; John Iffland, vice-president; W. H. Burns, secretary; C. R. Phillips, treasurer; and R. S. Woodrow, managing director.

MONTANA.

For some years in various parts of Montana there has been considerable agitation touching beet-sugar production. Experiments have been conducted on an extensive scale in many parts of the State. These have indicated that Montana, so far as soil and climate are concerned, has conditions quite similar to the other Mountain States, such as Wyoming, Colorado, and Idaho.

To grow sugar beets in this State irrigation is necessary. It is watered by the two branch systems of the Missouri River, one in the northern and one in the southern part, each flowing east. The great Missouri River has its origin in this State. It has as a part of the system the Yellowstone, which rises in the southwestern part and flows diagonally toward the northeast. Most of the districts in the State under investigation for sugar-beet production are located tributary to the rivers which afford irrigation facilities.

Following these watercourses there are three principal railroad systems: (1) The Great Northern in the north and (2) the Northern Pacific and (3) the Burlington and Missouri River Railroad in the south. The Great Northern and the Northern Pacific extend on through the State of Washington to the coast on the west, and eastward to the shipping centers of the lake region. Both of these routes have splendid facilities for through shipping from coast to coast.

Agriculturally Montana's resources are new and developing. Not nearly all the water in the State is utilized. At present irrigation is largely conducted from running streams. Each season there is a vast quantity of water running to waste to the sea. Many storage systems are in contemplation. When these are consummated, the agricultural resources of the State will be very much increased. At present it is a great grazing State, as the production of alfalfa and other forage crops is increasing, while dairying, creameries, and feeding are coming more into vogue.

There are many things favorable to the industry in general. Beets grown in the State are of high quality. Wherever sufficient water is obtained they are very productive. There are five or six places actively considering the installation of beet-sugar factories. I will mention those receiving the most attention this season.

CONRAD.—For four or five years different parties have been actively investigating this district. It is in Teton County, in the northern part of the State, bordering on the Canadian line, and one county removed from Idaho. The town is situated near the Great Northern, on the Great Falls and Canada Railroad. The farming district is watered by the Marias River, a tributary of the Missouri.

Experimental tests of the beets grown here have always indicated high quality. Parties representing the combination owning the six northern factories of Colorado, of which the American Sugar Refining Company is the principal, have been negotiating with the business interests of Conrad with a view to establishing a factory. An expert representing these interests thoroughly investigated the Conrad district during the summer. It is generally understood that he represents the American Sugar Refining Company and usually advances its projects for establishing new factories. It was given out by those locally interested that a factory would be established here, provided sufficient acreage could be secured for growing the beets.

In regard to growing sugar beets in the district, I wrote the Conrad Investment Company and received the following report from M. S. Darling, their engineer:

> CONRAD, MONT., *December 27, 1904.*
>
> DEAR SIR: In reply to your communication touching the trials that have been made in raising sugar beets, I would state that so far there has not been any special effort made in the raising of the beets. A number of parties put in a few this spring to see what could be done, but never took any particular care of them. However, they have been able to produce beets weighing from 2 to 6 pounds, with percentages of sugar from 14 to 16, and I understand one party last year raised some that went as high as 19 per cent.
>
> There are a number of parties in this section that are intending to put in beets again in the spring and will give them a better trial. This company raised some this year, but so far no tests have been made of them.
>
> Respectfully, yours,
>
> CONRAD INVESTMENT CO.,
> By M. S. DARLING, *Engineer.*

BILLINGS.—Another place receiving considerable attention in the State is Billings, situated in Yellowstone County. The county is crossed from the southwest to the northeast by the Yellowstone River. Billings is centrally situated on the river; also on the Northern Pacific Railroad. Irrigation is conducted from the Yellowstone. During the past season considerable activity was manifested in this district in investigating conditions and negotiating with capitalists with a view to establishing a sugar factory.

The Billings Land and Irrigation Company has constructed a ditch, tapping the Yellowstone and supplying water to 10,000 acres of land. This was largely the stimulating cause of the negotiations for a sugar factory.

December 2 a meeting was held, largely attended by farmers and local business men. It was addressed by Col. H. W. Rowley, M. A. Arnold, Henry White, W. B. George, H. M. Allen, E. B. Kent, W. H. Donovan, W. O. Parker, and I. D. O'Donnell. These represented those pushing the project locally. Previously a fund of $10,000 had been subscribed to carry on the preliminary work of investigation, etc. Assurance was given by the above gentlemen that sufficient acreage could be procured providing a factory is installed. F. M. Shaw, promoter of the enterprise, and Mr. Hawley, an expert from the Colorado districts, also participated. Half of the acreage required was guaranteed at this meeting. As indicating the interest in the enterprise, I reproduce here a report made by the committee previously appointed to visit the beet fields and sugar factories of northern Colorado. This committee was composed of W. O. Parker, C. M. Chaffee, Christian Yegen, L. A. Nutting, M. A. Arnold, W. H. Donovan, I. D. O'Donnell, and W. T. Clark. The report in part is as follows:

We have talked with men in the offices of the sugar factories, with men who solicited contracts with the farmers for beets, with men who have worked by the month on farms, with men who have farms for sale, with men who have farms for rent, with men who live on farms and grow beets, with professional men, business men, and retired men, and they all, without exception, speak of the beet industry in the most glowing terms and with the most unbounded confidence as being profitable for the farmer, whether he be an owner or a renter, and increasing the value of land from 5 to 150 per cent.

We will say that it is our opinion that lands tributary to Billings have all the advantages for the growing of sugar beets that the Colorado lands have, and some which they do not possess, namely, the absence of the hard, freezing weather in May which northern Colorado is subject to. Another very decided advantage is that we have a plentiful supply of water for irrigating the crop, which, we are informed, is very essential in growing sugar beets.

Now, we desire to impress on the farmers that it is absolutely necessary, if we are to reap the great advantages to be derived from the establishment of a beet-sugar factory, that they must assist in making contracts for the raising of the beets, because until a sufficient acreage is absolutely assured no company will consider the matter of establishing a factory here. We therefore, as a committee, urge and recommend that all farmers who are in reach of the factory or railroad enter into contracts at once for all the acreage they can respectively handle, so that the matter can be taken up in time by the factory people and the factory be built and placed in readiness to take care of next season's crop. Unless this is done we can not hope to secure the factory.

With reference to this project I publish an article appearing in the In-Mountain, of Butte, Mont., December 7.

The building of a beet-sugar factory in Billings and the planting of a large acreage of beets next season are assured. A stock company has been formed whose purpose is to buy or lease 1,000 acres of land in the Yellowstone Valley to raise sugar beets, and more than half the stock has already been taken. It is expected that the factory for the treatment of the beets will be in readiness for operation next fall. The soil of the Yellowstone is said by experts to be admirably adapted to the culture of sugar beets.

With reference to the conditions around Billings, the experimental work done, and general interest in the beet-sugar industry, I received from Mr. Henry White, secretary of the Billings Club, the following report:

BILLINGS, MONT., *January 13, 1905.*

DEAR SIR: Replying to your favor of the 17th of December, 1904, I beg to say that sugar beets have been grown in the Yellowstone and Clarks Fork valleys, in eastern Montana, in an experimental way and on a small scale for feeding for a number of years.

The results obtained in this manner, while little more than an index of what might be done under systematic cultivation and with a knowledge of how to attain the best results, have been so satisfactory, both as to tonnage and sugar content, as to attract the attention of capital interested in promoting the beet-sugar industry.

The mean temperature of the Yellowstone Valley for the summer months is about 71° F., with freedom from frosts from early May to early October. Its elevation is about 3,000 feet above sea level, with a soil varying from deep sandy loam to heavy clay, some alkali being present in all the heavier soils. Good limestone, coke, and steaming coal are all found within a radius of 100 miles at prices which compare favorably with those being paid in other localities where beet-sugar factories are now successfully operated.

We have but one record prior to 1898, namely, that of C. L. Tilden, of Park City, who had three tests made at the Bozeman Agricultural College (Lab. No. 239), showing 15, 16, and 17 per cent sugar, respectively. In 1898 I. D. O'Donnell and Charles I. Gardner, both of Billings, submitted beets for analysis, running from 7.98 to 10.92 per cent sugar. In 1901 three Yellowstone Valley growers submitted beets ranging from 12.36 to 17.2 per cent sugar, while thirty-two samples were sent in from the Clarks Fork Valley showing a sugar content ranging from 12.73 to 21.56, with a general average for all of 16.97 per cent.

The tonnage attained throughout these experiments ranged from 6.5 tons to the acre to 25 tons, only five falling below 15 tons per acre.

The purity coefficient varied from 41 to 90, with an average of 80.5.

For 1902 only four samples were sent to Bozeman for analysis. These showed 17.95 per cent sugar and 81.3 purity; 17.1 per cent sugar and 78.6 purity; 14.9 per cent sugar and 85.3 purity; and 17.86 per cent of sugar and 89.1 purity, respectively.

The foregoing is practically all the information bearing on the question of sugar-beet culture now in the possession of the committee.

Yours, truly,

Henry White, *Secretary.*

The Times, of Billings, December 12, gives the following information showing that all arrangements have been made for installing a sugar factory at this place, to be in operation for 1905:

All the land required, 6,000 acres, was subscribed at Saturday afternoon's business men's meeting at the city hall, many farmers also being present. So the beet-sugar factory is a go for Billings, and Mr. F. M. Shaw, the promoter and expert, will leave for the East this week to order the necessary machinery for the plant. Several hundred acres more ground than was needed was tendered by ranchers living south of the Yellowstone River. This offer will be held in abeyance in case any shortage should develop later.

This new enterprise for this section is the brightest opening for the farmer that could possibly happen, because of the good price assured him for his labor in producing the beets and the chance afforded of developing a new industry that will be of the greatest value to eastern Montana.

KANSAS.

Kansas was one of the first States to carry on extensive experiments for testing conditions favorable to the beet-sugar industry. These were conducted by the State experiment station at Manhattan. They were confined mainly to the more thickly settled and better developed eastern portion of the State, and in that part generally considered the corn belt and more secure from drought. At the time of these early experiments the western part of the State was generally considered better adapted to grazing; in fact, in this State, as in nearly all others, the original settlers had abandoned the western part, not considering it available for cultivated crops.

The results of these experiments originally conducted for the eastern section were generally considered unfavorable. For some years this verdict has been applied to the whole State; however, recent indications are more favorable for the western or semiarid portions.

The establishment of beet-sugar factories at Sugar City and Rockyford, in the eastern part of Colorado, along the Arkansas River, has reacted more or less in determining conditions in the western part of Kansas. Beets in Colorado are grown under irrigation, water being secured from the Arkansas River. The beet industry has thrived, the factories in these districts receiving a good tonnage and a high quality of beets. This stimulated farming districts along the Arkansas River in the western part of Kansas to test the qualities of soil and natural conditions favorable to the beet-sugar industry.

Through influences exerted from the western end of the State the legislature passed a law paying a bounty of $1 per ton on all beets grown in the State. Under this enactment beets have been grown commercially, more or less, along the Arkansas River, and particularly in Hamilton, Kearney, and Finney counties, for the last four years. The crop has shown quite favorable results during these seasons, except in 1903, when a late spring freeze caught most of the young beets. During 1903 and 1904 the springs have been quite wet and unfavorable for all cultivated crops. Sugar beets have shown, as a rule, better results under these unfavorable conditions than most other crops grown in the same districts.

Under the influence of this bounty law there has been grown in the State, during the past four years, sugar beets as follows:

Year.	Acres.	Yield, tons.
1901	337	1,747
1902	439	4,250
1903	800	695
1904	692	6,379

In explanation of the above table, I will state that the large acreage and small tonnage for 1903 is due to destruction of the young beets by the freeze already mentioned, the ground being afterwards planted with other crops.

Beet production has progressed along the Arkansas River as far east as Arkansas City, which is on the southern border of the State and about one-third of the distance west from the eastern boundary. Under the direction of the commercial club of that place beets were grown last year, and the encouragement was sufficient to promote experimentation on a larger scale during this season.

It will be interesting to note that most of the beets in these districts along the Arkansas River were raised without the aid of irrigation. In the northwestern corner of the State, in the counties of Cheyenne and Sherman also, active interest was taken in beet growing this year. The results were probably as favorable for a first season as any ever secured in any of the beet-growing sections of Colorado or western Kansas.

Twelve years ago I paid a visit to the western part of Kansas and eastern Colorado. It was just after the close of the apparently fruitless efforts of the original settlers to reclaim that portion of the country. The general verdict at that time was that the country must revert to the wild range for roaming herds of cattle and horses; for cultivated crops it was a failure. The abandoned fields, crumbling sod houses, and the departing settlers was a scene to elicit one's sympathy.

Experiences of recent years are demonstrating far better things for this section of the country. Recent visits demonstrate that the farmer with the plow is gradually penetrating this district and is here to stay. The change had its beginning in the irrigation facilities of the great Arkansas River, connecting the arid sections of the West with the green fields of the East.

Even when entirely dependent upon rainfall, farmers are gradually extending the cultivation of crops and achieving striking success under the circumstances. It is very encouraging to note the results in these western counties of Kansas which raised sugar beets during the past year. Here we find, with but little experience in beet growing, as high tonnage and as good average quality of beets as can be found in any other part of the country, whether water is furnished by irrigation or rainfall.

In order to secure the details of the work accomplished in these various places, I wrote to parties particularly interested in these beet-growing experiments and received the following reports, which I submit:

St. Francis.—This is the county seat of Cheyenne County, the northwestern corner county of the State. Beets were grown here by irrigation, the results of which are more particularly summarized by J. L. Finley, who reports as follows:

St. Francis, Kans., *December 10, 1906.*

Dear Sir: Yours of the 17th received. There were six different growers in this territory this year: Myself, 15 acres; Jacob Uplinger, 32 acres; George Weidenheimer, 8 acres; Mark Weidenheimer, 5 acres; Deroy Danielson, 15 acres; Josiah Crosby, 9 acres. The post-office address of all is St. Francis.

The beets from these fields have averaged a little upward of 13 tons per acre. The average cost per acre was about $30. We have received $5 per ton from the factory and expect a bounty of $1 per ton from the State.

All these beets were raised under irrigation. While there was plenty of water, it was not applied to the best advantage, as we have all learned since.

This is the first experience of all the raisers here, and I feel satisfied that the results are not to exceed half of the possibilities.

As to percentage of sugar and purity, we have not received a report of this yet. I sent in a sample nearly a month before harvesting and the factory reported 14.3 per cent sugar. I have since learned that the beets from here were testing 16 to 17 per cent sugar. The purity is also high. I can not give you figures now. In the meantime, however, I have no doubt you can get them from The Standard Beet Sugar Company, Ames, Nebr. I will be glad to assist you at any time.

Respectfully,

J. L. Finley.

In this locality there were 16 growers, harvesting 106 acres. The total yield was 1,487.7 tons, an average of 14.3 tons per acre. The total value of the crop was $7,438.50. One grower produced 387.9 tons from 33 acres, averaging 15.3 per cent sugar. For the crop off the 33 acres he received $1,949. His beets averaged 11.7 tons and brought $58.50 per acre.

Arkansas City.—At my solicitation, the Commercial Club of Kansas City had Mr. E. Kirkpatrick, chairman of the home industry committee, forward me the following report:

Arkansas City, *December 30, 1904.*

Dear Sir: Inclosed please find copy of this year's test in sugar-beet growing in this vicinity, giving the name and address of persons growing beets, per cent of sugar and coefficient of purity. I can not give you the tonnage, as the beets were grown in small tracts of one-half to 1 acre. We shipped one carload from Kildare, Okla.; one from Arkansas City, Kans.; one from Portland, Kans., to the American Beet Sugar Company at Rockyford, Colo., at a flat rate of $5 per ton.

The experimental work of growing sugar beets in this vicinity has been conducted by our commercial club. Our object is to locate a beet-sugar factory in this city. We feel very much encouraged from the present outlook and believe we will be successful. The spring of the year was rather unfavorable for growing beets on account of too much rain.

We contracted for and furnished seed for about 50 acres. I think I am safe in saying 85 per cent of the 50 acres were lost on account of the heavy rains, and this test which I send you is from about 15 per cent that succeeded in carrying their beets through the wet weather. The midsummer and fall proved very fine weather for the beets, and this splendid showing is the result:

Locality.	Grower.	Per cent of sugar.	Coefficient of purity.
Arkansas City, Kans	E. C. Crampton	12.4	70.3
Do	Fred Trimper	13.75	76.4
Do	Fred Demott	15.2	78.5
Do	J. H. Campbell	14.6	78.9
Do	W. C. Baker	16.5	82.5
Do	H. M. Griffith	13.6	78.8
Kildare, Okla	H. C. Gentry	14.2	77.6
Do	S. Spore	16.0	82.0
Do	Fred Smith	14.9	80.6
Do	F. R. Summers	14.4	80.0
Newkirk, Okla	Scott Wolfe	15.8	78.8
Do	O. L. Zook	15.0	66.5
Ponca City, Okla	B. L. Long	12.1	74.8
Do	G. M. McGee	16.0	80.8
Do	A. W. Hawkins	16.2	79.6
Do	Coates Bros.	14.5	77.1
Portland, Kans	R. H. Behlmer	15.0	79.8
Do	H. A. Young	14.5	78.8
Do	R. M. Brooks	15.0	77.8

It will be noted from the above table that for experimental beets grown by inexperienced farmers the sugar contents are very high. The indications of this table are that when beets have been grown for some time in this locality it is capable of producing those of high grade.

Emporia.—Emporia is in the eastern part of Kansas, in the corn belt. Experiments have been actively carried on during the recent revival of interest on this subject in the State. From Mr. Eli Fowler I have received a report of the results of experiments conducted in that vicinity during the past year. This I insert below. It constitutes a very favorable showing of results during this season, averaging in sugar content 14.6 per cent with a purity of 81.9. If beets like these of sufficient tonnage could be grown yearly in eastern Kansas, there is no question about the conditions in this part of the State being favorable to the sugar industry. Since that county receives a bountiful supply of rain, beets could be produced at considerably less cost than beets of like quality in the irrigated sections of the country. Mr. Fowler's report is as follows:

EMPORIA, KANS., *December 29, 1904.*

DEAR SIR: Replying to your favor dated December 31, received by me a few days ago, I would state that the sugar-beet industry in our section is as yet only in the experimental stage. For the two seasons last past we have conducted experiments under the direction of a county association, but both years have been exceptionally wet—almost a total failure of every other crop on account of the wet weather—and we have been handicapped on this account.

We have not conducted our tests with a view to determining the tonnage per acre of our beets. Our soil is such that we can raise enough beets should we attain the percentage of sugar and purity. We shall make further tests next season, with a hope that we may have a favorable season, so that our tests may be more conclusive.

We have no immediate prospect for a factory. Our tests have been conducted by the American Sugar Beet Company, of Rockyford, Col.

We are inclosing a table of the tests of last year's crop.

Grower.	Per cent of sugar.	Coefficient of purity.
H. T. Pickett	15.2	84.8
David Rees	14.2	80.2
H. J. Painter	14.5	81.4
L. Faulkner	14.6	80.5
H. R. Martin	14.4	78.0
A. D. Wilhite	14.1	80.1
J. W. Fowler	15.0	83.7

FINNEY AND KEARNEY COUNTIES.—In Kearney County the beets were grown mostly in the neighborhood of Deerfield and Lakin. From Lakin were shipped about 88 cars; 300 acres were planted to beets. The average was about 14 tons per acre. The following is a list of the growers around Garden City, Finney County, with the number of pounds of beets produced by each, making a total of 432.5 tons:

	Pounds.		Pounds.
Huffman	57,115	Diessem	75,630
Doty	89,165	Miles	35,420
Wash Jackson	20,530	Frank McCue	22,275
Baker	41,840	Pennington	53,180
Logan	43,520	Owens	125,810
Carpenter	177,780	Robertson	1,900
Carter	51,690		
Maroney	47,130	Total	864,910
Jerry Lewis	21,925		

With reference to some of the growers, the Topeka Capital, under date of December 1, has the following to say:

Jim Owens has finished loading his third car of sugar beets; total yield shipped, 125,810 pounds—over 62 tons from 4 acres, besides feeding 22 shoats that will now weigh 120 pounds, and some larger hogs, for which he believes 10 tons should be added to the yield. Allowing $25 per acre for expense, this gives him net $45 per acre.

It is hardly likely that the sugar-beet bounty will be continued another year. The industry is now well on its feet. Therefore in making contracts for the years to come the bounty will cease to be a factor. Growers and the beet company will have to govern themselves accordingly.

It is probable that inside of two years a factory will be established in western Kansas, somewhere on the Santa Fe line.

Manuel Baker, from 1¼ acres, raised 26 tons of sugar beets. At the market price, [illegible] per ton, this would make $115.55 per acre, windmilll irrigation supplying the moisture.

In addition to the yield as shown by scales, Wilson Carter has fed to hogs and now has on hand enough to make his showing 31 tons per acre.

Under date of December 13, the Kansas City (Mo.) Journal contained the following:

SUGAR BEETS $100 AN ACRE—NEW INDUSTRY A GOLD MINE FOR SEMIARID DISTRICT OF KANSAS.

LAKIN, KANS., *December 12.*—The sugar-beet harvest is over in the Arkansas Valley. Final shipments have been made to the sugar mills in Colorado. The weather throughout the harvesting has been fine. The shipments from Lakin aggregated 1,000 tons, and from Deerfield 4,000 tons, making 5,000 tons from Kearney County, or over 9,000,000 pounds of beets. This exceeds the big crop of 1902, which was 8,501,400 pounds, and is nine times as large as the crop of 1903.

The discouragements of last year are now banished by the remarkably fine crop just harvested. The present crop was seriously threatened by grasshoppers in the early spring months, and they did destroy several fields of beets around Lakin. Had it not been for the constant and vigorous war made on this unusual swarm of hoppers, other farmers would have met defeat in the loss of their chief money-making crop. As it is, 1904 exceeds all past yields, and makes it the most profitable crop that can be grown here.

It would take three years, and a fortune invested in cattle and lands, to grow 1,000 head of steers at $30 per head, to bring as much money as these Kearney County farmers realized from 300 acres of beets in one season.

The Topeka (Kans.) Capital, January 1, with reference to beet growing in the State, has the following to say:

A significant feature of the 1904 production is that over 25 per cent of the crop was grown in territory not before assumed to be suitable, viz, in the three extreme northwestern counties of Cheyenne, Rawlins, and Decatur, and also in Cowley County, 200 miles farther eastward than beets had before been grown for sugar in the Arkansas Valley. In the latter instance the experiments were made under the supervision of the Arkansas City Commercial Club, whose members are reported as being "very enthusiastic" over the results.

* * * * * * *

The cost per acre reported by 16 growers ranges from $15 to $46.50, and the greatest net profit per acre, exclusive of bounty, is $90. The largest yield per acre is 23.1 tons.

Following is the official list of growers of sugar beets during th season in the State of Kansas, with the pounds produced and boun received by each, under the laws of that State:

Results of growing sugar beets in Kansas in 1904.

Post-office and grower.	Pounds of beets.	Bounty.	Post-office and grower.	Pounds of beets.	Bo
Lakin:			Deerfield—Continued:		
H. K. Boehn	158,000	$79.00	M. D. Blehn	562,000	281.00
A. G. Campbell	358,000	179.00	Beell Bros	478,000	239.00
Carl Coerber	470,000	235.00	J. W. Bell & Son	104,000	52.00
A. E. Cross	150,000	75.00	E. A. Beckett	342,000	171.00
Wm. Day	68,000	34.00	C. L. Beckett	446,000	223.00
Benj. F. Dye, sr.	46,000	23.00	M. A. Coerber	122,000	61.00
John F. Entz	101,000	50.50	S. H. Corbett	46,000	23.00
R. M. Edmiston	34,000	17.00	O. J. Downing	156,000	78.00
Henry Entz	278,000	139.00	W. E. Downing	78,000	39.00
H. F. Entz	128,000	64.00	J. S. Friesner	674,000	337.00
Franz Faldtz	134,000	67.00	A. J. Gillock	490,000	245.00
Nathan Fulmer	76,000	38.00	H. Gillogly	122,000	61.00
F. R. French	16,000	8.00	R. D. Glass	82,000	41.00
F. A. Gulick	152,000	76.00	Fred Hurst	50,000	25.00
Jacob Holloway	32,000	16.00	C. H. Hartman	10,000	5.00
Oscar Hurst	130,000	65.00	T. J. Isaacs	260,000	130.00
Chas. A. Hawk	46,000	23.00	Wm. T. Kell	192,000	96.00
William Logan	126,000	63.00	H. F. Kriete	46,000	23.00
D. H. Camp	22,000	11.00	J. T. Kell	136,000	68.00
Joseph McCoy	108,000	54.00	C. S. Logan	336,000	168.00
E. F. Miller	106,000	53.00	Adam Moltz	108,000	54.00
Thos. D. Nash	150,000	75.00	J. C. McConaughey	52,000	26.00
Jacob Regehr	60,000	30.00	J. R. Woodward and H. F. Faldtz	100,000	50.00
H. C. Stocking	72,000	36.00	A. D. White	242,000	121.00
G. C. Smith	46,000	23.00	Commercial Club of Arkansas City	50,000	25.00
A. W. Suddeth	16,000	8.00	Tracy:		
Newton:			E. E. Schultz	82,400	41.20
J. M. Rost	128,000	64.00	Irvin Robinson	132,000	66.00
Garden City:			John J. Holmes	128,200	64.10
S. E. Austin	18,000	9.00	D. S. Yost and J. Walton	177,400	88.70
M. M. Baker	44,000	22.00	Herndon:		
Wilson Carter	46,000	23.00	E. Parry	51,800	25.90
Sumner Carpenter	142,000	71.00	Joseph Brown	105,800	52.90
Lee L. Doty	80,000	40.00	Mary Brown	48,000	24.00
L. L. Dimmon	80,000	40.00	J. P. Jontgen	56,200	28.10
W. J. Ellis	12,000	6.00	R. H. Schove	139,000	69.50
S. D. Huffman	50,000	25.00	Frank Studer	46,000	23.00
Wash. Jackson	18,000	9.00	St. Francis:		
Jerry Lewis	16,000	8.00	Josiah Crosby	232,000	116.00
D. H. Logan	42,000	21.00	D. Danielson	327,200	163.60
F. H. Miles	42,000	21.00	John L. Finley	364,000	182.00
F. N. Moroney	46,000	23.00	Jacob Uplinger	775,800	387.90
Frank McCue	18,000	9.00	G. S. Weidenheimer	144,000	72.00
J. L. Owens	116,000	58.00	Mart Weidenheimer	148,000	74.00
Frank Pennington	46,000	23.00			
Deerfield:					
J. L. Couch	176,000	88.00			
E. A. Bruns	214,000	107.00	Total	12,760,400	6,379.30

NEBRASKA.

There has been considerable agitation during the past year, tending to increase the beet-sugar industry in the State of Nebraska. Next to the one at Alvarado, Cal., the factory at Grand Island, Nebr., was the second factory successfully operated in the United States. Another followed at Norfolk the next year. Nine years later another one was built at Leavitt, near Ames, on the Union Pacific Railroad, about 50 miles west of Omaha. This gives Nebraska fourteen years' experience in beet-sugar production. Beets for these three factories are grown in districts where crops are produced by rainfall. In the fourteen years the State has developed considerable of the information covering beet growing in rainfall districts.

There were many things in the early days restraining the progress of the industry. The State offered a bounty for all sugar manufactured in the State. Litigation as to the constitutionality of this law arose between the management of the factory and the State auditor. The matter has been under a contest for a number of years, the State refusing to pay the bounty. Finally the supreme court, during the past summer, rendered a decision against the sugar company. No doubt the factories at Grand Island and Norfolk were inspired originally by the offer of this bounty.

Considerable friction occurred between the management and the farmers growing beets. Two or three years' drought caused poor crops. Then better seasons, more favorable to beet growing, followed. Later came an attack on the beet crop by a disease generally denominated "beet blight." This produced another poor year for the farmers. All these things had a very great tendency to discourage the industry in the State. During all their pioneer experience the factories established in Nebraska passed through very trying ordeals. It became necessary to close down the factory at Grand Island for a couple of campaigns, until these difficulties could be overcome or adjusted. Beets grown for this factory were shipped to Norfolk.

Coupled with the natural difficulties attending the pioneer experience of these factories was the one spoken of so often—general lack of experience in growing beets and appreciation of the benefits of a successfully operated sugar factory. The obstacles were so various and continued that it took considerable time to institute a fairly favorable normal condition of things.

During the time stock interests of the localities were very much increased and improved generally, especially around Norfolk and Grand Island. Originally the pulp by-product was thrown away, or deposited out on the prairies; I saw some of this same pulp fed to stock four years afterwards. This fact has always been a strong evidence of its keeping qualities. Around Grand Island at present many thousand head of sheep and cattle are fed annually. This is due to the pulp supply of the sugar factory. Large feeding and dairy enterprises sprung up around Norfolk, also due to the same causes.

It was the policy of this company, in encouraging beet production, to furnish no pulp except to those growing beets. Finally this became a very strong incentive to induce the farmers to raise beets. During the seasons in which the beets grown at Grand Island were shipped to Norfolk, I observed a very striking illustration of the value of beet pulp. Many of the farmers and feeders of Grand Island insisted on the pulp being shipped back to them at Grand Island. The freight alone on this pulp, from Norfolk to Grand Island, was something like $1.25 a ton. This demonstrates that some, at least, of the farmers and feeders learned to appreciate its value. The incentive for building the factory at Leavitt was that of securing the pulp for feeding the stock of the Standard Cattle Company. This company annually feeds thousands of head of cattle or sheep, being one of the largest establishment of the kind in the West.

All three factories in the State of Nebraska have been operated through continuously improved conditions for the past four years. Each of these factories during the last campaign had more and better beets than at any other time in its history. Many of the farmers have come to understand the incidental benefits of the sugar industry, and are becoming larger and more regular contributors to the supply of beets. They have noted the improvement of their farms and their increased facilities for stock raising and cropping generally.

In the western part of Nebraska, large tracts of land are coming under cultivation, stimulated by the introduction of irrigation. It is found that beets are well adapted to the conditions and a most profitable crop, and they are becoming the leading crop in two or three counties. The beets have been grown under contract and delivered to the factories farther east at Grand Island, Leavitt, and Norfolk. As a rule these beets are high in sugar content, the tonnage is large, and they yield a larger profit than any other crop grown in this western section. They also enter very nicely into rotation with other crops grown there, principally alfalfa, and small grain.

The centers surrounded by these beet districts in the western part of the State are North Platte, in Lincoln County; Culbertson, in Hitchcock County, and McCook, in Red Willow County. More beets are now grown in Lincoln County, around North Platte, than in any of the counties having sugar factories. Each one of these places is earnestly endeavoring to establish a factory. This is in accord with the policy I have mentioned before of building new sugar factories in districts where beets are grown extensively for other factories. There can be no mistaking natural conditions under such circumstances. While these western districts, for a few years, have been helping to augment the supply of beets for the factories farther east, the factory managements have been steadily building up their local supplies. Both the Standard Sugar Company, at Leavitt, and the American Beet Sugar Company, at Grand Island, have been contemplating the erection of factories in the new western districts which they have developed.

The removal of the plant from Norfolk, Nebr., to Lamar, Colo. (which is now in process), has excited considerable discussion throughout the country. Many seem to take it for granted that the beet-sugar industry in Nebraska is a failure. Because this plant has been established about fourteen years, and then moved to another State, it seems proof positive to many that conditions in Nebraska will not sustain the sugar industry. If it were not for the facts, it might be logical to assume that such is the case.

I have not been advised as to the real purposes of the American Sugar Refining Company in moving its plant from Norfolk to Lamar, but I take it that it was not from a failure of the plant, but that the move was more in keeping with the policy the company maintains. This plant goes to a location near Rockyford, where this company has another large plant. The one at Rockyford has built up a large beet-producing district. For this plant the Lamar section had been growing beets quite extensively for two or three years. It is demonstrated that Lamar is a very desirable location for a sugar factory. Surrounding it are cheap lands, which can be purchased for a small price per acre. With the aid of irrigation these lands become very productive and valuable. In establishing its recent factories, this company has followed the plan of acquiring a large tract of land connected with the plant.

For the American Beet Sugar Company it is purely a matter of business sagacity to locate at Lamar; otherwise the district it had developed would be invaded by others interested in factory building. Located at Norfolk, Nebr., the factory was practically isolated; the lands are high-priced; it had taken this company considerable time to work up local interest to the point of promoting its successful operation. It is not likely the company would want to build another factory in the vicinity of Norfolk.

For three years Norfolk has had a good supply of beets and successful campaigns. The last was the best in the history of the factory. It began operations October 4 and continued until December 10. This gave it about seventy days, running at full capacity. It would be hard, with such facts as these before us, to demonstrate that the factory at Norfolk retired from that field for want of beets or for lack of profitable work. The factory has built up during these years conditions making its work much more easy and profitable. It was, however, destined to confine its operation purely to sugar making, while in its new field it will serve its owners better, not only in sugar making, but in developing the agricultural resources of a large district.

Farther east of its new location, its owners have been closely studying a district in Kansas with conditions similar to those at Lamar. It is quite probable that they will locate a factory in this Kansas field. West of Lamar, and equally distant from Rockyford, they have been studying carefully the conditions at Las Animas. A factory at each of these places would give them a chain of plants along the Arkansas River, working beets produced by their own irrigation systems, all building up values of lands and rents, towns, railroads, and auxiliary improvements of various kinds, all of which will redound materially to the benefit of the owners of the Norfolk plant removed to Lamar. So I think it is not a question of how well the Norfolk plant was doing in Nebraska, but how much better it will do in Colorado.

The new factories in Nebraska in the near future will be erected a
some of the western points recently developing through irrigation.

North Platte.—A plant has been contemplated at this place fo
some time. Its conditions have been thoroughly tested by growin
beets for the factories of both the American Beet Sugar Company an
the Standard Beet Sugar Company. It has grown in one season a
high as 4,200 acres, practically equally divided between the tw
companies.

Beets at this place have tested as high as any in the country. Considering wagon and carload lots, it has the highest record of quality o
any place in the world. The yield has been quite satisfactory also,
running easily from 10 to 20 tons per acre.

The valley from North Platte to Paxton is about 33 miles long an
5 miles wide, all of which area is subject to irrigation, and consequently is adapted to beets and other crops. The locality has soil
and conditions highly satisfactory for producing beets. The great
drawback is insufficient farmers and laborers to do the work.

Each one of the companies growing beets here has announced that i
will install a factory as soon as enough settlers and laborers can b
attracted to insure field hands to grow the beets needed by the plant.

McCook.—The conditions around McCook are quite similar to those
described for North Platte. This place continues to grow sugar beets
extensively for the factories farther east in the State. The beets show
good yield, quality, and purity. Lack of farmers and laborers sufficient to furnish a factory with a supply of beets is the main difficulty,
the same as at North Platte. The vicinity has sufficient land under
irrigation to grow the beets and other crops entering into the rotation.

There are several parties interested in this locality prepared to
install a sugar factory when conditions are favorable. This district is
watered by irrigation from the Republican River. The farmers have
been growing beets to a considerable extent for the last four years.
During this season the district grew enough beets to run an ordinary
factory of 350 tons during an average campaign.

Below I publish a report from E. E. Maxon, the agent and superintendent of the Standard Beet Sugar Company, in charge of the work
of growing beets in that locality for this company:

McCook, Nebr., *December 28, 1904.*

Dear Sir: Your communication regarding sugar-beet culture in this locality was handed me a few days since. Replying to same will say that we have passed the experimental stage, and have grown beets successfully for the last two years.

In 1900 there were about 400 tons grown in the Republican Valley. This year there have been 25,000 tons grown, at $5 per ton, between Oxford and Haigler, Nebr., including the Frenchman Valley.

Prospects for a factory are good, but we must get more people located here and lands worked in smaller holdings, with a better class of husbandry. Our company has agreed to build a factory as soon as developments will justify. The quality of beets grown is good, averaging about 15 per cent sugar, with a purity of about 80. To give a list of growers would require some time and work, there being 300 or more.

Yours, respectfully,

E. E. Maxon, *Agent.*

Culbertson.—What has been said about conditions around North Platte and McCook is practically applicable to this place. It has the same conditions of soil and climate. Given sufficient water it produces beets of high grade, like the other two. It is in Hitchcock County, on the Republican River, which flows through the central part of the county from west to east and is joined by the Frenchman River at this point. These two rivers afford considerable opportunity for irrigation.

Considerable quantities of beets have been grown for factory purposes, the same as in Lincoln and Red Willow counties. While it is possible that factories will be located at the other two points first, it is also highly probable that this place will be the next in line. It has the available territory, water, and all the conditions for maintaining a sugar factory when it secures the settlers and laborers necessary to accomplish the work of growing beets and other crops.

UTAH.

Utah has had considerable agitation this year pertaining to the extension of the beet-sugar industry. Building new factories in the State is attended with the usual conservatism.

Taking into account the population of the State it has already developed large interests in beet sugar production. Up to date this has been accomplished by two companies—the Utah Sugar Company and the Amalgamated Sugar Company. The Utah was the first in the field, erecting a factory at Lehi thirteen years ago. Working in conjunction with this plant are three slicing stations connected with it by pipe lines conveying the juice to the main plant in Lehi. In addition to this plant and its auxiliaries the company operates another plant at Garland, in Cache County, in the Bear River Valley, in the northern part of Utah. It also operates two others in the western part of Idaho. The Amalgamated operates a factory at Ogden and another at Logan, both in the northern part of the State; also one at Lagrande, Oreg.

The State presents many advantages for this industry. It was one of the first in the field to attempt manufacturing sugar from beets. The operations of this concern, through its long experience, developed much of the early information bearing on the subject, of which not only the new concerns in the State but all others in the Rocky Mountain irrigated sections are the beneficiaries.

Probably the history of the factory at Lehi best illustrates the general experience of the beet-sugar industry in the irrigated sections. It is now one of the most successfully operated plants. In the beginning it encountered many vicissitudes due to general lack of experience.

All the beets in the State are grown by irrigation. The supply of water for field crops is dependent largely on winter snows. When these are bountiful a good season is anticipated in the State. More or less rain falls during the spring season. Irrigation is applied when necessary to supplement the moisture from rainfall.

Throughout the agricultural sections the farms are usually of small size. Owing to the peculiar policies of the people originally settling the State, intensive agriculture is the rule. The early settlers who secure a sustenance off these small farms are accustomed to hard work. They have a labor system peculiar to the Mormon sect admirably adapted to their needs. A sugar factory thrives best when surrounded by small farms, and especially when these farms are operated by people accustomed to methods involving intensive cultivation.

As a rule the irrigation districts are supplied from small streams of water flowing down the canyons directly from the melting snows of the mountain. The people are not only utilizing water for growing crops in the valleys, but are utilizing the power of these mountain streams as they flow down the gorges. This power is applied industrially in many forms; it is especially employed in facilitating the sugar industry, propelling interurban lines, and in furnishing light, power, and other facilities.

The lesson taught through the experience of the first factory has borne fruit conducive to more conservative plans in those that have followed. Additional factories in this State have been installed only in districts where conditions have been fully developed, where everything necessary for sustaining the beet-sugar industry was fully understood in advance. Each of the sugar companies follows a well-defined policy in the operation of its factories, building up an ample beet-growing territory before establishing a new factory. Agitation or pressure for new plants comes from the farming districts rather than from the factory. The beet-growing inclinations of the farmers have outrun the capacity of the factories, and others are desired.

In the State, stock feeding, dairying, and other interests feel the influence of the sugar industry, and have been built up with it. Indications point to conditions favorable for installing two factories in the State in the near future.

GUNNISON.—Extending south from Salt Lake City, tapping centrally the agricultural districts of Salt Lake, Utah, San Pete, and Sevier counties, is the Rio Grande Western Railroad. On this railroad, about 30 miles from Salt Lake City, near the large fresh-water lake known as Lake Utah, is the Lehi factory. This factory has been supfilled with beets from a large agricultural district, made up of various valleys throughout these counties.

From farther south beets have been delivered by railroad; also some of the beets in the territory nearer to the factory. For the purpose of facilitating the delivery of the raw product to the factory, the plant has installed three slicing stations in different directions, at distances varying from 12 to 20 miles over the railroad. On account of scarcity of cars during the beet-delivery season the plant was hampered many times in securing its supply of beets. This was occasioned by large shipments of ore and other material requiring the attention of the railroads at the particular season when the beets had to be shipped. The pipe lines running from these slicing stations to the factory have completely eliminated the trouble for the localities possessing the slicing plants. But the district south of the factory, included in Sevier and San Pete counties, has always experienced difficulty in shipping its beets on account of this scarcity of cars. The district is naturally quite favorably located for a sugar factory. It is approximately 100 miles from the factory at Lehi. The management of the factory at Lehi has given the district considerable attention, evidently intending at some time in the future to construct a plant at some central point.

Beet growing has become so popular with the farmers in these counties that they are exerting pressure tending to influence the early installment of a beet-sugar plant. Negotiations have been opened with outside parties. Having spent considerable time and money developing the district, the management of the Lehi concern naturally feels this to be an invasion, and that, if a new plant is to be constructed, it should be a part of the Utah Sugar Company's system.

Considerable agitation has proceeded among the farmers and business men of this section with a view to the immediate building of a factory. Several meetings have been held during the summer. Negotiations have been conducted with other parties besides the Utah Sugar Company. Mr. B. F. Locker, of Salt Lake City, representing eastern capitalists, made a proposition to install a plant at this place of 750 tons daily capacity, provided 6,000 acres of beets are guaranteed. This plant is to have sufficient slicing stations to accommodate the whole district in Sevier and San Pete counties. A mass meeting made up of 125 farmers, representing all the precincts of these two counties, except two, was held. The convention, in the interest of the district, accepted the proposition made by Mr. Locker. It voted to hold another meeting at an early date for the purpose of meeting those represented in financing the project and to arrange the details of its installation. The matter has naturally aroused more or less controversy on account of the interest of the Utah Sugar Company.

In view of the extent of beet growing in this district, and the interest it has aroused on the part of investors, it is settled that either the Utah Sugar Company or Mr. Locker will build a factory in this district for the campaign of 1905.

LEWISTON.—As in the case of Gunnison, there is a rivalry of interest in the building of a beet-sugar factory at Lewiston. This is on the Cub River, in Cache County, about the central part of the State east and west, and near the northern line. It will draw its beet supply from Cache County on the south and Idaho on the north, as it is situated near the State line. The factory of the Amalgamated Sugar Company at Logan is located about 30 miles south. Beets have been grown quite extensively in the county for this factory. The management of this enterprise has given more or less attention to the Lewiston district and its interest in a new factory. It appears that the Logan interests look upon Lewiston as a possible future location of a sugar factory; also, that they think the immediate building of one would be premature.

Other parties have been actively considering the project and negotiating with those of local interest at Lewiston. Assurances were given publicity several times in 1903 that plans had already been arranged for the establishment of a factory. There has been considerable revival of this talk. It seems quite certain that out of this, some time in the near future, a factory will be established at this place either by Amalgamated interests or others.

The Logan (Utah) Journal, under date of December 8, has the following to say:

> The prosperous town of Lewiston is in the throes of a rather acute excitement over the strong probability that the proposed beet-sugar factory will be built at that place in time for operation next year. In fact, current reports are to the effect that the matter has been definitely settled and that there is no longer any doubt of the enterprise being pulled off. It is said that the location has been decided upon and that the plant will be built on the creek on the east side of the town site, just immediately east of Oscar A. Pope's ranch. This will make Webster's spur the nearest railroad point at present. Of course, the factory people will construct tracks to the plant.

WASHINGTON.

The claims of the State of Washington in establishing the beet-sugar industry are beginning to be appreciated. Like many of the mountain States, its agricultural awakening is of recent date. In the past it has been grazed and sown to wheat and small grains in large fields.

It has great mining resources and lumber interests. Through these and its oriental and Alaskan shipping it first received its great prominence. There are beautiful fertile valleys among its mountains and expansive table-lands in the eastern part, all arable and fertile to a remarkable degree. Its resources are so vast and numerous that it is denominated by tourists "the Pennsylvania" of the Pacific coast.

For some years experiments have been carried on to test its conditions for growing sugar beets. In the State a factory was installed, at Waverly, in 1899. Like many new and undeveloped sections of the country, its great difficulty has resulted from the sparseness of its population. On account of the small amount of labor required, it is easy to sow large fields of wheat and graze large herds of cattle.

Many places in the State have shown ideal conditions for the sugar industry; but before these can be utilized more highly developed conditions must prepare the way. A large amount of pioneer work in other directions is needed to pave the way for the projects contemplated in the State. Irrigation ditches are necessary and railroads and settlers. Fortunately, the promoters of the beet-sugar propositions in the State were wisely guided by the experience of other parts of the country.

The factory at Waverly demonstrated many things regarding the installation of the sugar industry in Washington. In the first place it has revealed ideal natural conditions so far as the soil and climate are concerned. It has met with considerable difficulty, however, on account of lack of the other facilities. It is hard to make an intensive farmer out of a wheat grower or a grazer or a miner. It has felt sorely the lack of a more dense population—more and better trained men in the beet fields. Its progress has been slow but steady.

Fortunately the plant was controlled by a man accustomed to building railroads in new undeveloped districts, and awaiting the progress of development to reward him for his energy and foresight. He has followed the same course with the sugar factory. It has required great energy, faith, and business tenacity to pull the sugar enterprise up from its beginning to its successful status of to-day. So far as systems of agriculture and applied methods in the fields are concerned it required the remaking of the factory's environment.

Beets grown in this district, properly cultivated, are of high quality. Located in the vicinity of this factory is an extensive garden-seed producer. This gentleman was impressed with the high quality of beets grown in the vicinity. He concluded that the conditions were favorable to producing high-quality beet seed and this would extend his seed business. Following a careful system of physical selection, he began the production of beet seed. He had not the facilities, chemical laboratories, etc., maintained by the foreign beet-seed grower. His first product of seed demonstrated higher qualities than any of those imported from foreign countries with all their scientific accoutrement, care, and attention. His seed produced beets averaging 19 per cent in sugar. They were very strong in vitality, yielding many more germinations per 100 and in shorter time than the seed generally imported.

I mention this in connection with the State of Washington, because the work this gentleman has started is receiving the cooperation of the Department of Agriculture. Producing beet seed in this country suggests the possibilities of a great future industry. It is intimately associated with vital improvements to the beet-sugar industry itself. It is a part of the industry's development in the State. Its results also indicate the favorable conditions of the State.

YAKIMA.—The further extension of the industry in Washington seems most likely to occur at Yakima. A company has been organized, known as the North Yakima Beet-Sugar Company. The incorporators of the company are Jacob Furth, C. J. Smith, J. W. Clise, Lester Turner, I. A. Nadeau, C. W. Adams, and C. L. McMahan, all of Seattle; T. B. Wallace, Tacoma; Edward Whitson and G. S. Rankin, of North Yakima. The board of directors consists of Jacob Furth, C. J. Smith, J. W. Clise, Lester Turner, I. A. Nadeau, C. W. Adams, T. B. Wallace, Edward Whitson, G. S. Rankin. Six of these men are bankers. Mr. Nadeau is the general agent of the Northern Pacific in Seattle. Mr. Whitson and G. S. Rankin are business men of Yakima.

The capital stock of the company is $1,000,000, divided into 10,000 shares of $100 each. The company purposes establishing several plants, the first at North Yakima, to be followed by others at Prosser, Wenatchee, and Puyallup.

According to the articles of incorporation, the purpose of the company is to manufacture sugar, molasses, sirup, beet pulp, alcohol, vinegar, wood alcohol, glue, glycerine, acetate of lime, and all other by-products of sugar beets. The company is to acquire water rights, construct electric power and light plants, buy farming lands, and engage in all the auxiliary branches of industry of a manufacturing corporation.

The site chosen for the factory is near North Yakima, and consists of 80 acres located on the Northern Pacific. It has ample side tracks, shipping facilities generally, and a water right guaranteeing sufficient water to meet all the needs of the plant. The factory is to have a capacity for slicing 600 tons of beets daily, and is to be completed in time for the campaign of 1905. Contracts have been arranged for 5,000 acres of beets.

In order to gain the latest data with reference to the beet-sugar enterprise at North Yakima I wrote Mr. Henry B. Scudder, of that place, who reports, under date of December 28, as follows:

NORTH YAKIMA, *December 28, 1904.*

DEAR SIR: There have been few experiments in beet culture here this year. The beets raised in the Moxee Valley yielded at the rate of 30 tons to the acre. Samples were sent to the St. Louis Fair to be inspected. We are at present securing the acreage for a beet-sugar factory, and the matter is practically closed.

Yours truly,

HENRY B. SCUDDER.

WISCONSIN.

During the past year activity in promoting and extending the beet-sugar industry has been more extensive and general throughout Wisconsin than any other State. In 1901 a factory was installed at Menomonee Falls. The career of this concern has been very highly satisfactory from the beginning. In growing sugar beets and manufacturing sugar it has done much to develop the general conditions and resources of the industry in the State.

From the first inception of the industry in the early days the promoters of the beet-sugar industry looked favorably upon Wisconsin. A factory was installed at Fond du Lac thirty-six years ago. It achieved considerable success, but was finally moved to the western coast on account of better facilities for securing capital, labor, etc.

The management and capitalists of the factory at Menomonee Falls have adopted the policy of gradually establishing other plants as the operations of this one pave the way. With this in view, considerable acreage of beets has been contracted at favorable points, such as Chippewa Falls, Janesville, Watertown, and one or two other places. It is the policy of this company, through this method, to thoroughly test agricultural districts, and at the same time educate the farming and business community in regard to the methods and requisites of a factory.

In the following interview in the Milwaukee Sentinel, April 5, the manager of the Menomonee Falls factory, Mr. R. G. Wagner, discloses this policy:

> Wisconsin will be a great producer of sugar as soon as its vast areas of land become more densely settled. There is room enough for at least 30 factories, but the trouble is there is not enough labor to be had to raise the necessary beets that will be needed by the factories.
>
> Beet culture requires a study of several years before the farmer is enabled to raise the kind that makes good sugar, and for this reason I do not think a factory will be built at Eau Claire in the immediate future. We have a factory at Chippewa Falls that will be ready this fall (1904), and that will take care of 600 tons of beets daily during the four months it will be in operation; but the beets that it will consume will come from almost every part of the State. We have farmers growing beets for us wherever the soil is such as to warrant the experiment, and when we find the farmers are sufficiently ambitious to make a success of the venture we will erect a factory; but for the present we shall content ourselves with the two in which we are now interested—the one at Menomonee Falls, which has been in operation with unqualified success for the last three years, and the one at Chippewa Falls.
>
> We had intended to put up a plant at Janesville, and have not yet given up the idea entirely, even though Captain Davidson has been induced to move his Canadian factory to that place. We find that at present not enough beets are grown there to keep a factory busy for two months. We are also experimenting with farmers in Dane County, and I think we may eventually put up a factory in that district, as the farmers thereabouts have shown a special aptitude for beet growing.

Following this policy, this company has built up quite extensive beet-growing interests around Chippewa Falls and Janesville. Each of these districts demonstrated capabilities for producing beets of desirable quality and in quantity sufficient to sustain a sugar factory. In pursuance of the plan, the parties interested in the factory at Menomonee Falls built a factory at Chippewa Falls during the past season and equipped it with the machinery previously used in the factory at Kalamazoo, Mich. The farmers and business men of Janesville had also become thoroughly interested in this subject; negotiations were inaugurated with the management of the factory at Dresden, Canada, conducted by Mr. Theodore Hapke, of Chicago, a beet-sugar factory promoter. Its interests were controlled by this gentleman and Capt. James Davidson, of Michigan. It appears that it was not receiving a sufficient supply of beets in its Canada locality; arrangements were therefore made to move it to Janesville, where it operated during the campaign of this year.

The success of the plant at Menomonee Falls, and the consequent development of beet growing around a number of centers throughout the State, stimulated by the work of the two new factories operating this season, has opened up a number of new fields, where the sugar industry is receiving serious consideration.

From time to time I have outlined the many favorable conditions and facilities for the beet-sugar industry in this State. It has extensive manufacturing interests. Like Michigan, it was once the field of active lumber production. The forests gave out, leaving combinations of business men with capital seeking something new. Its transportation facilities are ideal. It is penetrated in every direction by railroads. In its northern or unsettled portion these were installed to facilitate the lumber industry by transporting logs and lumber.

On the east it is bordered by Lake Michigan, upon which it has large commercial centers, communicating by lake shipping with Chicago and other extensive markets in its immediate vicinity. On the north it has Lake Superior and the great shipping system from Duluth, furnishing cheap transportation to Eastern markets. On the west it is bordered by the Mississippi River. Certainly with such advantages its position becomes commercially strategic. Reinforcing facilities of transportation and markets are many natural resources stimulating production—soil, mines, and mills.

Its agricultural resources are extensive. In the southern half of the State these are highly developed. It maintains many intensive interests. The two especially favorable for advancing the sugar industry are its creameries and its tobacco production. The one creates a demand for its by-products; the other develops the features of intensive agriculture.

Its cropping interests are admirably adapted to rotation and soil improvement. The legumes are especially productive, notably clover. This forage crop grows prolifically in all parts of the State. Unlike

Michigan is its development of dairy and stock interests. Also its methods of farming are much better adapted to fostering the industry from the beginning. Starting later the mistakes and difficulties characteristic of much of the work in Michigan will benefit the sugar industry in Wisconsin.

There are vast tracts of land in the northern third of the State unreclaimed. The woodman has denuded them of forests; the railroads are there, with small villages and hamlets denoting the former activity of the region. The methods for reclaiming these lands have been somewhat of a problem. These lands are covered with stumps and second-growth timber. A large part of it was originally settled by homesteaders, the balance passing into the hands of private owners through Government grants. Neither class of these original proprietors conceived a use for these lands other than their timber privileges. The settler sold off his timber to the sawmill, and in most instances moved off the land, allowing it to fall into the hands of the tax title speculator. The larger tracts have been collected by other speculators into still larger holdings.

Five years ago this was the general status of all that region of northern Wisconsin known as the "stump country." Gradually it has developed that these lands possess high agricultural utilities. Through natural seeding the whole face of this vast territory is becoming set to timothy and clover. Both of these grow luxuriantly.

Around the small towns and more settled portions along the railroads, small farms of a few acres have been cleared, upon which various kinds of crops have been grown. These have served the experimental purpose of disclosing the resources of all that part of Wisconsin.

It is found that the soil is very productive of many things in addition to those mentioned; small grains, root crops, and many varieties of fruits, especially winter apples. On account of its great drawback, the stumps, it has been slow in developing. Settlers have preferred lands like those of Kansas, Nebraska, the Dakotas, and the irrigated lands of the mountain States, in preference to these stump lands. The expense of removing the stumps is estimated to be from $5 to $40 per acre, depending upon the number, character, and size of the stumps.

The owners of these lands have been looking for a crop adapted to the section, that will reclaim it to profitable cultivation. Gardening will do it; but the region is too vast to plant entirely to garden products. Tobacco has done the work on some of it; but its progress has been slow, and it is not adapted to the northern part of the State. To clear land of stumps and plant small grains will not pay, because western prairies produce our best crops of wheat and other small grains simply by breaking the sod and sowing the seed. The culture of sugar beets seems best adapted to this purpose, and this crop is gradually penetrating the stump fields of Wisconsin. Prepared and planted to beets they give a rental value of $5 an acre, or a selling value of $75. Much of this stump land can be bought for $5 per acre.

From the standpoint of the investor financing a sugar plant in northern Wisconsin is quite similar to that in our arid States. Reclaiming arid lands requires considerable expense in building irrigating ditches. In addition it costs about $10 an acre annually to water the land. In Wisconsin these stump lands can be bought for a small expenditure per acre. Instead of investing money in irrigating ditches it must be applied to eradicating the stumps. Nature is bountiful in her supply of rain. This eliminates the cost of watering the land. In either case the low cost of lands makes it possible, with a small additional capitalization, for the corporation to acquire a large body of land.

Twenty years hence I look to see productive beet fields in that part of northern Wisconsin which is now a wilderness of stumps. After them will naturally follow all the other crops adapted to its soil. Through these will be brought industrial production, with many of these crops supplying the crude materials: Stock breeding, the dairy, the fattening pens, the canning factory, the creamery, the flour mill, the sugar factory. Each new factory installed under the present policy of establishing sugar factories will serve as a developing influence in its territory. Beet production will extend each year to new localities.

During 1904 there were a number of places in Wisconsin where the installation of the beet-sugar factories was under consideration. I will mention the leading places and some of the conditions and circumstances operating to arouse public interest:

BURLINGTON.—From time to time there has been more or less activity at Burlington touching the installation of the sugar industry at that point. Under the stimulus of overtures made by Michigan interests, looking to the establishment of a factory here, there was considerable agitation of the question this year. Desiring to procure as definite information as possible concerning the interest at this place, I wrote Mr. John Spieker, requesting a report on the situation.

He does not appear to hold out much encouragement regarding the prospects of a sugar factory in the near future. His communication, however, reveals some of the things often mentioned by me with which the sugar industry has to contend. He appears to claim that the creamery industry has gained so strong a foothold and absorbs so much attention as to make it difficult to propagate among the farmers an interest in beet growing. In stating this difficulty he has given the strongest argument for the installation of a sugar factory, as the refuse of the beet fields—composed of the poor beets and beet tops—with the pulp from the sugar factory would be the great bulwark of the creamery industry. This communication also reveals the natural conservatism of farmers when approached on this subject. The report is as follows:

BURLINGTON, WIS., *January 7, 1905.*

DEAR SIR: In reply to your request, I must say that there has been no sugar-beet seed planted this year in my neighborhood. However, I have made some experiments with seed sent to me by the Wisconsin Experiment Station. I also planted 1½ acres in sugar beets for the Menomonee Falls sugar factory, with results not very encouraging. The season was so dry and hot that the beets could not grow; the crop was very small, only 10 tons from the plot, but the per cent of sugar content was high—averaging over 14 per cent. The name of the seed was Kleinwanzlebener. The seed I got from the State Experiment Station was of the same variety. I planted this seed about eight years ago, and the result of the test was also over 14 per cent.

The sugar industry got a bad blow the year the farmers raised about three carloads of beets for the Menomonee Falls factory by being wholly unprofitable. Farmers did not understand the crop cultivation and did not take proper care of same, and the labor question was a serious one. Of late years farmers have had hard work to hire hands to do the necessary farm work which they are accustomed to do with the aid of machinery, to say nothing about the hand work they must perform in sugar-beet fields. Aside from that, the beets were raised too far from a railroad station; hence the interest was killed right there.

Before we ever thought of the Menominee Falls factory a brewer of Milwaukee wanted to build a sugar factory at Burlington; bought a farm and promised to build. The citizens of Burlington gave him all the encouragement they could; they collected money and sent a committee with this capitalist to look into the Nebraska factories. It was favorably impressed, but the whole plan fell through because the farmers would not sign enough acreage. The capitalist wanted 2,500 acres pledged for three years. The farmers around this town were not pressed hard enough to take it, and the beet-sugar interest is a thing of the past.

The capital went back to its old stand-by, brewing beer, and the farmers kept on milking cows, and will do so until they get hold of something that pays better. We now have a milk-condensing factory at Burlington that receives about 50,000 pounds of milk daily in winter, and I believe it would be a hard matter to turn the farmers to any other course, as this is a home enterprise, and we are in a section of country with the right kind of grass.

Yours, truly,

JOHN SPIEKER.

CALEDONIA.—The business men of Caledonia and the farmers of the vicinity are taking an active part in promoting an interest in the beet-sugar industry at this point. Recent press dispatches, under date of December, announced that plans have been matured for building a plant costing $600,000. This naturally suggests a plant with a daily capacity for slicing 600 tons of beets. The promoters of this enterprise are Louis Volters and Joseph Stehlik.

CLINTON.—At Clinton several public meetings were held and the sugar industry discussed. At these meetings parties from Janesville outlined the requisites necessary for establishing a sugar factory.

EAU CLAIRE.—At this place also considerable interest has been aroused. It is only 8 miles distant from Chippewa Falls, which is already operating a factory. Consideration of the question at Eau

Claire has been promoted by the interests operating the factory at Janesville. The proximity of two factories, one at Chippewa Falls and the other at Eau Claire, would naturally bring the two concerns into considerable competition in the district. For this reason more than usual attention was aroused. Mass meetings were held and lively interest was awakened generally.

The Eau Claire Leader was very energetic in promoting public sympathy and activity in installing a sugar factory. The Eau Claire Commercial Association guaranteed 1,000 acres of beets. The proposition before the association was that made by Mr. Hapke, manager of the sugar factory at Janesville, as given by the Leader, March [illegible], 1904:

> "We ask for no bonus, only beets," was the keynote of the practical, business-like talk of Mr. Hapke.
>
> "If this association will guarantee 1,000 acres of sugar beets this year I will agree to pay the rate of $4 per ton to the farmers for such beets delivered in the cars, and as much more as I can, if suitable freight rates can be obtained from here to Janesville. Then give us, say, 4,000 acres the second year and we will build and operate a factory like the one we are putting up in Janesville, and the size of it will rest only on the amount of acreage contracted for."

Eau Claire has been considering the proposition of installing a factory for three or four years. It looks at the present time as if matters are drawing nearer a culmination.

GREEN BAY.—Green Bay had under active negotiation a proposition for building a sugar factory. It was made to the Business Men's Association of that place, the offer being to build a plant, provided sufficient contracts could be made with the farmers to produce a supply of beets. This was under consideration by this association September 13, and efforts were made to meet the stipulated conditions.

With a view to learning the latest information concerning the situation at Green Bay, I wrote Mr. Silas S. Smith of that place, who reports as follows:

> GREEN BAY, WIS., *December 29, 1904.*
>
> DEAR SIR: In reply to yours of the 23d, asking for information in regard to the growing of sugar beets in this locality, I will say that I do not feel competent to give you a very detailed account of what has been done, but will do my best.
>
> All beets grown about here have thus far been shipped to Menominee, Mich., that being the nearest factory; 1903 was the first year of the industry. With the exception of a few shiftless growers, who got practically nothing in the shape of a crop, the tonnage ran from about 10 tons to 24 tons, grown on 1 acre, as an experiment.
>
> The factory people tell us that the beets of 1903 averaged 15.6 per cent sugar for the season, and that Green Bay beets were a little better than the average. This season (1904) opened up with a much larger acreage in beets, showing that the first season was fairly satisfactory to the growers. The factory, as special inducements, offered several prizes to the growers of the best crops of beets in plots of 3 and 5 acres. I have not yet seen the official returns from the factory showing who came out ahead, but from all I can learn the first prize (a barrel of sugar) will be taken on a 5-acre field yielding a little over 21 tons per acre, with a sugar test of 13.8 per cent. The next best was 15 and a fraction tons per acre, sugar test 15.2 per cent.

There seems to be a very great variation in the sugar content, even with beets grown on apparently the same soil and under the same conditions. The factory reports that the beets for 1904 contained 14.45 per cent of sugar as against 15.6 per cent in 1903.

There has been some talk of a factory at this place; but I do not think there is much prospect for one for some years, as the one at Menominee can, and will be glad to, use all the beets grown in this section for a long time to come, as their season's run has been very short.

I am not in position to give you names and addresses of growers, as I am personally acquainted with but few of them. Most of these speak favorably of the growing of beets. As to my own opinion on the matter, if you care for it, I will say that I believe it a fine thing for the growers and the country generally.

Yours truly,

SILAS S. SMITH.

MADISON.—Late in the season Madison took up actively the consideration of establishing the beet-sugar industry. Beets have been grown here for the factory at Janesville and were pronounced by the management of that institution of excellent quality.

Madison is situated between two beautiful lakes. It is surrounded by an old substantial farming community, accustomed to the better modes of farming. It is the location of the State experiment station and the home of Prof. W. A. Henry, its director. He has been very active in experimenting and studying the interests of the beet-sugar industry in the State for a number of years. He took an active part in considering the installation of this factory at Madison. With reference to this enterprise the American Sugar Industry and the Beet Sugar Gazette has the following to say under date of December 20, 1904:

> Work on the new 600-ton beet-sugar factory will be commenced as soon as the weather will permit excavation. Contracting for acreage is in progress and farmers are signing rapidly upon the following basis: The minimum price of beets is to be $4.50 per ton. For all beets testing over 14 per cent the company will pay 25 cents more per ton. The company will also pay 25 cents per ton in November to farmers holding their beets and not anxious for early shipments. The company will furnish expert advice to the farmers in caring for their crops, and all testing and taring will be done by men appointed by Prof. W. A. Henry, of the University of Wisconsin. Outside shippers will be granted a rate of 25 cents per ton for a distance of 50 miles, and all car shipments will be weighed by the Western Railway Weighing Association.

With reference to the organization and installation of this plant, the Eau Claire Leader, under date of December 3, reprints from the Madison State Journal the following statement:

> A sugar-beet factory for Madison costing nearly three-quarters of a million is one of the immediate coming additions to industrial Madison. Articles of incorporation with a capital of $700,000 were filed in the office of the secretary of state to-day for the Dane County Sugar Refining Company. Theodore Hapke, of Chicago, one of the principal owners of the factory recently opened at Janesville, and United States District Attorney William G. Wheeler, of Janesville, are in the city in its interest to-day and brought the articles with them. The factory will be a duplicate of the one at Janesville and will probably be built on the east side of the city in the town of Burke. It will have a maximum capacity of 600 tons—that is, it will be able to

> grind that many tons of beets every twenty-four hours. The incorporators whose names are attached to the articles are C. S. Jackman, Arthur P. Burnham, and W. G. Wheeler, of Janesville, but the principal owners of the business will be James Davidson, of West Bay City, Mich., and Mr. Hapke, chief owners of the Janesville plant.
>
> Mr. Hapke will open an office in the city immediately to push the new enterprise and will begin contracts with the farmers at once to buy their beets. He asks no bonus of the city of Madison or any other parties, but wants their moral support and encouragement, which he feels confident of getting. The plant will occupy a large space of ground, as such plants do, and will have a pulp-drying factory also. He says Dane County soil is admirably adapted to the raising of beets and that many Dane County farmers who raised beets for him this summer for the Janesville factory raised as much as 20 tons to an acre. They are paying at Janesville $4.50 a ton for beets off the wagon. The supply of sugar, says Mr. Hapke, is not keeping up with the constantly increasing demand, and he predicts a prosperous future for the sugar-beet business.

To which, by way of comment, the editor of the Leader adds:

> The business men of Eau Claire city and the farmers of Eau Claire County should bear in mind that a sugar factory can be had here just as soon as the necessary acreage is subscribed. Let this not be forgotten or put aside. With a very little exertion we can have a plant costing $750,000 and employing 500 hands.

MANITOWOC.—The Milwaukee News prints a report from Manitowoc, dated December 13, which reads as follows:

> At a meeting called to interest farmers of the county in sugar-beet raising at Frances Creek, 70 tillers of the soil discussed the subject in all details yesterday, and it is probable that a beet-sugar factory will be located here. C. A. Watrous, of the Caledonia Beet Sugar Company, addressed the meeting.

PRAIRIE DU CHIEN.—For some time the business interests of Prairie Du Chien have been actively considering the proposition of establishing a sugar factory. Beets have not been grown around this locality extensively except in an experimental way. Mayor Mortimer and others of the town have been actively negotiating with the management of the Janesville factory with a view to securing a factory at this place. It appears that a proposition was made to Prairie Du Chien interests that a factory of 800 tons capacity would be built at this place to operate in 1905, provided contracts for 5,000 acres of beets are secured. In order to defray the expenses of securing this acreage the city donated $2,500 from its treasury. With reference to this project, the American Sugar Industry and Beet Sugar Gazette quotes Mr. E. C. Amon, who is secretary of the progressive association and cashier of the Crawford County Bank of Prairie Du Chien, as follows:

> We have made arrangements with Mr. Theodore Hapke, of Janesville, to locate a sugar factory here this spring. We are to secure an acreage of 5,000, and have men out who are working among farmers for a 3-year contract. We will have the necessary acreage by March 1. Farmers are very enthusiastic over the prospect of a sugar factory here.

RACINE.—During the past year there has been considerable discussion on the subject of establishing a beet-sugar factory at Racine.

This probably grows out of the agitation that has taken place at Caledonia and Mount Pleasant near this city. It appears that the interest aroused in this instance is coming from the farmers themselves, headed by Mr. Alois Volter, who has been connected with sugar-beet growing in Michigan and Wisconsin for some time, and Mr. Joseph Shalik, editor of the Slavie, the leading Bohemian paper of the Northwest. It is proposed that the farmers in these localities absorb about $300,000 worth of stock.

Some consideration has been given to the location of the factory at Caledonia, and also to establishing it at Racine, which is a manufacturing point of some note. Several meetings have been held at Racine and by the farmers at Caledonia. It appears that public interest aroused in this place may eventually result in the establishment of a factory.

WATERTOWN.—For some time the farming district surrounding Watertown has been growing sugar beets for the factory at Menomonee Falls. It is one of the original sites selected by the Wisconsin Sugar Company as available for establishing a factory. Railroad interests particularly are urging this place as a proper location.

SPARTA.—Under date of December 20, in the American Sugar Industry and Beet Sugar Gazette, of Chicago, occurs the following with reference to Sparta's interest in the beet-sugar industry:

> Messrs. G. W. Bartlett and Lew Roberts who, with William Van Antwerp, came here from Sparta to interview the Janesville Beet Sugar Company with regard to putting up a factory at Sparta returned with a very favorable report and the assurance that if the citizens of Sparta take hold of the matter as they should a factory can be erected inside of a year. If a beet-sugar plant is put in at Sparta, it will probably be a duplicate of the one at Janesville. The representatives of the Janesville company will visit Sparta in the course of a week to consult with the business men and farmers in regard to the matter, and if satisfactory terms can be made the plant will no doubt be installed next year.

MENOMONIE.—Considerable interest has been aroused at this place touching the building of a sugar factory. This is in Dunn County, a little west of Chippewa Falls and Eau Claire. It has grown beets more or less for the factory at Menomonee Falls in past years. The Menomonie Times, with reference to conditions and the practicability of establishing a sugar factory at this place, wrote Prof. W. A. Henry, director of the State Experiment Station at Madison. Professor Henry has pursued a constant study and investigation of soil conditions, crop productions, markets, and the development of the agricultural resources of the State generally. His reply is very suggestive and to the point. Since Professor Henry is the highest authority in the State on all subjects touching its agriculture, I reproduce a portion of this letter which appeared in the Eau Claire Leader, December 24, 1904:

> Replying to your request of December 17, I will say that in my talk before the people assembled in the Congregational Church in your city, which talk was purely an accident, I told them among other things that if any State east of the Rocky

Mountains could successfully support beet-sugar factories it was Wisconsin. I tol them further that we now had three factories in successful operation in Wiscon the oldest one at Menomonee Falls close to Milwaukee, and two factories runni this year for the first time, one at Janesville and one at Chippewa Falls.

A representative of the Chippewa Falls factory, a Mr. Postel, has recently been t your city soliciting beet acreage. I wish to say that I have known Mr. Postel f some time, and I am also acquainted with Mr. Wagner, manager of the Menomon Falls and Chippewa Falls beet-sugar factories. Both these gentlemen are, so far a I am aware, reliable and have always carried out their contracts and promises i regard to beet factories and the purchase of beets.

I told your people in my little talk that it was not time yet for a sugar factory t be built at Menomonie; that a factory costs from $400,000 to $600,000, and that w could not expect capitalists to invest that large sum of money until they were su that the farmers would grow beets enough to properly and profitably support such a mammoth institution. Farmers can not prudently contract to grow beets for thre to five years until they know whether they want to grow them at all or not, an whether there is a profit in growing them. No factory can afford to locate at a give point until it can have at least 8,000 acres of beets contracted for five years in advanc

The farmers of Dunn County should next season grow not less than 1,500 acres o beets. The Chippewa Falls factory will furnish the seed, send men to explain th work, and give all advice and counsel necessary to properly carry on the work. Th next fall these beets can all be shipped to Chippewa Falls and there be made into sugar. The price of beets runs from $4.50 to $5.50 per ton. The yield runs from to 20 tons per acre, generally 12 to 15 under favorable conditions.

Now, if you can grow 1,500 acres of beets at Menomonie the coming season, and can get $60 to $70 per acre for the crop, it will bring a whole lot of money to your community.

If the people around Menomonie will grow 1,500 acres of beets next year and 2,000 or 3,000 the following year, I am sure capitalists will be willing to come to your town the third year and put up a factory, provided at that time the farmers are still satisfied with the business.

Let me say in conclusion that the beet-sugar industry offers a fine opportunity for Dunn County. You can grow eight or ten thousand acres of beets in your county and still raise as much clover, corn, and other crops as now. I would rather see Dunn County go into the beet growing than into tobacco production. Every dollar of beet money will go to the farmer, to the boys and girls who help weed, to the railroad companies for freight; and thus the money will be well distributed. Your business men should take this matter up and push it vigorously, as it means a whole lot of money for Menomonie.

Beets should be grown in rotation and never twice on the same land until other crops have intervened. Wisconsin's sugar bill is over $6,000,000 a year, or $20,000 a day. Why not produce the sugar and save that vast sum to the State instead of sending it to Germany or Cuba? I sincerely hope your people will push this matter.

WYOMING.

There are three or four places in Wyoming actively investigating the establishment of the beet-sugar industry. Generally its conditions are quite similar to those of Montana, Idaho, and Colorado. These have been thoroughly outlined in the discussions of the agricultural conditions of those States. The consideration of this subject for this

State must necessarily be confined to a few points, though there are very many places adapted to this industry when the State shall become more densely populated, and when railroads and other developing agencies shall make all parts more accessible.

Like other mountain States, its energies have been directed largely to its mining interests. Its agricultural development is of later date, and promises much under the influence of irrigation. Extensive agriculture will be confined necessarily to districts accessible to irrigating facilities.

The principal streams affording water for irrigation are: The Green River and its tributaries, draining to considerable extent the southern and eastern half of the Yellowstone Park, flowing south through Sweet Water County; the Big Horn and its tributaries, which rises in the central part of the State and flows north through Fremont and Big Horn counties, covering a large part of the northwestern corner of the State; the Powder and Belle Fourche, in the northeastern part, flowing north; the first watering Johnson and Sheridan and the second Cook and Weston counties; the North Platte and its tributaries, in the southeastern corner of the State, flowing east, covering Carbon and parts of Matrona, Converse, Albany, and Laramie counties.

The principal sections of the State now under consideration are naturally those having already established irrigation systems and which are better developed in agricultural production, viz, the southeastern part, watered by the North Platte and its tributaries, and the northwestern part, watered by the Big Horn and its tributaries.

The State has some peculiar advantages of its own applicable to the beet-sugar industry. It has extensive coal fields covering a large part of the State. The quality is of the best lignite variety. Mines are being rapidly developed. This State is fast demonstrating its ability to furnish its own people and those of surrounding States with a cheap fuel of good quality.

In addition to this, in several sections of the State large oil fields have been discovered. This petroleum product has proven itself a very extensive fuel resource. The coal, petroleum, and mineral deposits are stimulating increased transportation facilities and general industrial development.

The State possesses those admirable qualities of climate especially favorable to root growing, and especially many days of sunshine for the elaboration of sugar in the beets. At present Wyoming is one of the greatest grazing States in the Union. Stock interests would be enhanced especially by the installation of the beet-sugar industry.

Fort Laramie.—Various interests have concerned themselves from time to time in that section in Laramie County near Fort Laramie. This is the junction of the Laramie River and the North Platte. Irrigation has developed to a considerable extent in that locality; it has railroad facilities, and is especially promising for the installation of the beet-sugar industry. No doubt a factory will be located somewhere in Laramie County in the near future.

Lovell and Garland.—There is a large colony of Mormons settled in what is known as the Big Horn Basin. Stimulated by the advantages of this settlement and the general adaptability of the soil and climate, the district has been under investigation for some time. The Utah Sugar Company, in which the leaders of the Mormon Church are interested, have been giving considerable attention to the claims of this section in Wyoming.

Byron Session, president of the "Mormon stake" and the principal officer of his sect in that locality, announced that the Mormon interests in sugar production in Utah will build a factory of 800 tons daily capacity in this section, to be in operation in 1905.

A test of beets grown here by the Utah Sugar Company showed an average of 14 per cent sugar, and proved that their maturity is much earlier than in the State of Utah. The location of the factory is to be at Lovell or Garland. Whichever place is selected, it is quite probable that the other will follow with a factory some time in the near future.

Of this project, under date of October 9, the Salt Lake City (Utah) Herald has the following to say:

> Last summer representatives of the Utah Sugar Company visited Big Horn County in the interest of this enterprise. They made an analysis of the soil, thorough tests of the beets grown in that locality, and all other investigations deemed necessary. As the result of this, it is announced unqualifiedly that next spring work will be started on a sugar factory at Lovell that will cost $800,000.

Sheridan.—The location of a factory at Sheridan has been more or less under consideration for the past three or four years. The soil has been tested, beets have been grown which have proven of fine quality, and natural conditions seem very favorable to such an enterprise.

During this summer parties interested in sugar production in northern Colorado, around Longmont, Loveland, and Fort Collins, have been making special investigations of this place. F. M. Shaw, a special promoter representing the interests of the Fort Collins factory, and Mr. Patterson, of Loveland, investigated this field in the latter part of the fall. In January Mr. Patterson, assisted by Mr. Loukes, cashier of the First National Bank of Sheridan, and Mr. Masters, one of the leading ranchmen and cattlemen of that section, were actively promoting the establishment of a factory at this place. The two gentlemen in interest at Sheridan visited the factory and beet fields at Fort Collins and were quite enthusiastic in the movement. Prospects for a factory at this point hinge largely upon the disposition of the farmers to grow the beets. Indications point to a factory at Sheridan in the near future.

RECAPITULATION OF NEW FACTORY PROJECTS.

Locations where arrangements are complete for the establishment of factories in 1905 (12 in number), with the capacities of the plants in tons of beets daily, are as follows:

CALIFORNIA: Colusa, 400 tons.
COLORADO: Lamar, 500 tons; Brush, 600 tons; Holly, 600 tons.
IOWA: Davenport, 500 tons.
ILLINOIS: Riverdale, 350 tons.
MONTANA: Billings, 600 tons.
UTAH: Gunnison, 600 tons; Lewiston, 600 tons.
WASHINGTON: North Yakima, 600 tons.
WISCONSIN: Madison, 600 tons.
MICHIGAN: Blissfield, 600 tons.

The other points at which factories will quite probably be built in the near future (32 in number) are as follows:

COLORADO: Brush, Julesburg, Craig, Sterling.
IDAHO: Caldwell.
IOWA: Iowa City, Des Moines, Marshalltown.
MICHIGAN: Sault Ste. Marie.
MONTANA: Conrad.
KANSAS: St. Francis, Arkansas City, Emporia, Lakin, Deerfield, Garden City.
NEBRASKA: North Platte, McCook, Culbertson.
WISCONSIN: Burlington, Caledonia, Eau Claire, Green Bay, Manitowoc, Prairie du Chien, Racine, Watertown, Sparta, Menomonie.
WYOMING: Fort Laramie, Lovell, Garland, Sheridan.

CLIMATIC CONDITIONS AND FARM AND FACTORY RESULTS FOR 1904.

FAVORABLE CLIMATIC CONDITIONS.

Generally speaking, the season has been quite favorable throughout the beet-growing districts. In many respects the year seems to have been a turning point for the industry. As a rule, factories after closing the campaign of 1903 were unable to secure sufficient acreage. The general favorableness of the season of 1904, coupled with the better adaptability of the growers to beet production, has brought about much better satisfaction among the farmers, greatly improving the prospects for the next season. Labor for the fields was much more easily secured than usual. While the acreage for each factory, as a rule, was less, the average yield of beets was much better and the percentage of sugar and purity of the beets was remarkably high.

Throughout the beet-growing districts conditions were not so favorable for other crops. This has produced a general feeling favorable to beet growing. Conditions, methods, and results of the beet crops are now so generally appreciated that farmers are much better qualified to make deductions. Viewing the country as a whole, the beet-sugar industry may be generally considered progressive. This is more particularly due to the following reasons:

BETTER METHODS AND IMPROVED FACILITIES.

There is a very marked improvement of methods throughout the country. Factories are more insistent on methodical supervision of the beet growing—selection of land, distribution of better seed, and better cultivation. The farmers are giving more attention to the growing of beet crops, the preparation of the seed bed, cultivation, doing things at the proper times, and are getting much better results. Factories through the country during the season gave considerable attention to improvements in methods and facilities. Especially noteworthy is the introduction of processes for more complete extraction of the sugar in the molasses. This is accomplished usually by the processes known as "osmose" and "steffin." Most of the factories use the osmose process for the more nearly complete extraction of sugar from the molasses. In order to accomplish this work to a greater extent many have installed the steffin process.

In addition to improvement of the factories themselves, the year has been marked by a vast improvement in the installation of switches, country dumps, branch railroads, trolley lines, irrigation, better wagon roads, more satisfactory contracts with the farmers, and better relations between the factories and the beet growers.

The improvement is also noticeable on the farms around factories where beet growing has obtained for a considerable time. Soil improvement is especially noticeable. As a rule, in every factory district the average yield has been higher than that of any other year since the beginning of the industry.

To the same extent is noticeable the improvement of the auxiliary features of the beet-sugar industry. Throughout the length and breadth of the beet-sugar belt, especially in the beet-sugar factory districts, there is a very rapid increase in cattle feeding, breeding, and creamery production.

The beet-sugar districts have greatly improved and increased general agricultural resources. Rotation is more generally practiced, and fertilization of the soil is becoming the rule. These districts are permanently establishing the crops to be grown in rotation with sugar beets.

At the close of no other year has there been so many different enterprises for the establishment of additional factories on foot. Indications point at this time to a large number being installed in the country during the next two years.

Along with the general improvement of methods and results on the farm is the introduction of improved implements. It may be said that there is a general tendency to do away with much of the hand labor incident to sugar-beet growing. At present a large part of the labor of growing this crop is in the hand work required in bunching, thinning, weeding, and harvesting the crop. From many places are reported special implements introduced for the first time this season, designed for bunching the beets. These are generally denominated "blockers." At present this is accomplished with the hoe in the hands of a laborer passing down the row, clipping out the beets from spaces in the row, leaving bunches 7 to 10 inches apart. The purpose of the "blocker" is to do this work. It is an implement working automatically, and pulled by a horse, and it bunches or "blocks" two rows at once.

At present harvesting the beets is accomplished by the aid of simple plow harvesters, which cut off the tap roots of the beets, loosening and to an extent elevating them. Following this comes the hand laborer, removing the crowns with a knife and piling the beets ready for loading into wagons. The "Yankee" is diligently trying to invent a harvester, one that will loosen, elevate, top, cleanse from dirt, and load the beets into wagons. Quite a number of these were tried for the first time this year with considerably more success than in any previous year. Enough has been demonstrated by these different harvesters to indicate that we are eventually to have a harvester which will accomplish much of the work now done by hand.

SUGAR BEETS AND HAIL STORMS.

In many places in the Mississippi Valley and the intermountain States the hailstorm is the terror of the farmer. As a rule such storms do not cover large areas. Oftentimes, however, they almost totally destroy the crops on the areas covered, bringing loss and ruin in their wake. They often beat the vegetation in the fields into a bruised and shapeless mass. Few crops can recuperate under such circumstances, and certainly none so quickly or completely as sugar beets. I have seen the same field of beets twice in one year denuded of every vestige of leaves, with the beet crowns bruised and battered up, recover and produce a tonnage averaging with beets in a near-by locality not disturbed by hail.

Sugar beets carry their own insurance against a hailstorm. This is a fact well worthy of consideration by farmers planting crops in beet-growing sections, and one which is now thoroughly appreciated by such farmers. The views presented in Plates I and II illustrate the hardiness of sugar beets under such conditions when well started.

Plate I represents a field of beets doubly afflicted on June 27, 1903, the picture (fig. 1) being taken the next day. The field belongs to Jesse Forbes, near Kersey, Colo. First, a terrific hailstorm on this date destroyed the leaves of the beets. Then, following the hail, came excessive rains which flooded the field, causing the beets to fall over on their sides apparently completely washed out of the ground.

Figure 2 shows the same field of beets as it appeared on July 23 following. As soon as the owner could get on his land after the hail and flood, the beets were given a deep cultivation, and were straightened up with hand and hoe. As shown in figure 2 the beets have fully recovered and show a healthful growth with abundant foliage only twenty-six days after the storm.

Figure 3 shows a view of the same field taken September 5, just prior to the harvest. These beets were a little bent and unshapely, but they yielded 16 tons per acre, with high sugar content and purity. What other crop could have made such a showing!

Plate II represents the field of R. F. Alden hailed out June 27, the view (fig. 1) being taken June 28.

Figure 2 represents specimens of beets taken from the field six days after, showing the growth of foliage in that short period.

Figure 3 represents the same field as it appeared September 5, just prior to the harvest. This field yielded 24 tons per acre, with high sugar content and purity.

EXPERIMENTS ALONG NEW LINES.

During the season there has been a great deal of experimentation in beet growing in the fields. The Bureau of Plant Industry of the Department of Agriculture is endeavoring to produce a race of beets having seed balls containing but a single germ (see p. 161). At the present time the seed commonly used has from 1 to 7 germs in each seed ball, many of them producing that many plants. It is evident that this very materially increases the difficulties and expense of thinning. By the single-germ seed it is expected to do away with a large part of this work and expense.

The Bureau of Plant Industry is also endeavoring to establish the production of home-grown seed (see p. 177). For this purpose it has been furnishing different factories and growers in the country high-quality seed. It hopes to develop seed of higher germinating power, which will produce beets of higher sugar content and purity.

The Bureau is also experimenting to discover the elements of fertility required in the different sections where sugar beets are grown (see p. 167). For this purpose it is conducting fertilizer experiments. Many of the factories throughout the country cooperated with the Bureau in promoting this experimental work. Results of much of this work have already indicated a great field for future improvement. These experiments will be continued and extended.

The results of the year demonstrate that the beet crop is very remunerative, compared with others. Our farmers, with their better understanding of the crop and methods of production, are considerably

EFFECTS OF HAIL AND RAIN ON FIELD OF BEETS.

1, Beets hailed and flooded out June 27; 2, same field 26 days later; 3, same field September 5.

EFFECTS OF HAIL STORM ON FIELD OF BEETS.

1, Field of beets hailed June 27; 2, beets from same field 6 days later, showing new growth of leaves; 3, same field September 5.

reducing the cost of the work. Taking the average yield the country over, coupled with the average price, there is no other field crop that can make as favorable a showing. The average gross receipts per acre for the beet crop during the year were, in round numbers, about $50 per acre. The average net returns, after deducting the cost of production, were from $15 to $20. We have a great many instances of farmers receiving $100 to $125 per acre.

There are many things which denote the general beneficial effects of the beet-sugar industry. These are especially noticeable in States where the industry has been established to a considerable extent. In Utah, Colorado, and Wisconsin the press and public are thoroughly convinced of its usefulness. Enough has already been developed to indicate that it may be the developing industry of Idaho, Wyoming, Montana, and many other places whose conditions and resources agriculturally are in their infancy. The status of the industry in Colorado furnishes the greatest object lesson of all.

In the following pages I give a review of the status of the industry in the several States in which it has been established, and an account of the operations of the several factories and their results for the year 1904:

CALIFORNIA.

It may be stated that prevalent conditions in California were generally quite favorable during the year. The industry has been gradually growing up to the boundary lines set for it some time ago. The factories in the State, while not numerous, are unusually large. This practically has the same effect as the building of a larger number. It has taken several years for some of these concerns to increase beet growing in their districts to the point where the supply of beets equals the demand.

The operations of the year developed nothing of special importance that is new. Each year adds to the irrigation facilities of the beet-growing districts. This applies to irrigation from running streams, from storage reservoirs, and from artesian wells. Probably the most noticeable improvement in connection with the industry is the rapidly growing stock-feeding interest induced by the sugar industry. In general the operations of the five factories which were running in California in 1904 may be summarized as follows:

The average acreage of the factories in operation was 6,560 acres.

The average yield per acre was 12.01 tons.

The factories worked an average of 79,000 tons of beets.

They produced in sugar an average of 18,662,380 pounds, or 9,331.19 short tons, per factory.

The sugar content of the beets averaged 15.74 per cent; the purity, 81.13.

Altogether the factories paid to the farmers, in round numbers, $2,000,000 for beets.

Of the eight factories in this State three did not operate this year.

Crockett.—The factory at Crockett was a combined beet-sugar plant and Hawaiian sugar refinery. It has ceased the production of beet sugar and continues as a refinery.

Watsonville.—The factory at Watsonville has been closed during three campaigns.

Alvarado.—This factory was eighty-two days in operation during this campaign. The rainfall was irregular and scant during the winter preceding the season of 1904, very little falling in the months of January and February. This caused farmers to fear a shortage and impelled them to seed for grain or hay. In March there was too much rain, preventing field work. Precipitation occurred on twenty-six days in the month. Only 15 acres of beets were sowed previous to April 1. From April until August good growing weather prevailed, with July and August not too hot. In August, before the beets gave any outward signs of maturity, such as the yellowing of the lower leaves, the district had a comparatively heavy rain. This was followed by heavier and more copious rains during the last third of September. As a consequence, the beets continued to grow at the expense of both sugar and purity.

The beet crop is growing in favor with the farmers, as they now pay more attention to rotation and to cultivating their crops, thus getting more tons per acre. Beets were furnished the factory this year by 246 contracting farmers. The price paid for beets was $5 per ton.

Prospects for next year depend upon the rainfall during January, February, and March. If plenty of rain falls during this time, prospects are good for the planting of about 5,000 acres of beets next year.

The factory usually plants one-third each of the varieties of seed named below, with their sources of supply: Wohanka & Co., Prag. "Zuckerreichste;" W. Mette, Quedlinburg "Elite" Kleinwanzlebener; Kleinwanzlebener "Original."

The prevalent soil in the district is sandy loam, subject to overflow. All beets are grown without irrigation.

Betteravia.—Conditions for beet growing were quite favorable in this vicinity during the season. Beets for this factory mature early, the sugar campaign usually beginning the first part of July. The beet crop generally was very satisfactory throughout all the districts furnishing it a supply. This year the factory began slicing beets July 10. The amount of beets worked was the largest in the history of the factory.

Chino.—Weather conditions were quite favorable for beet growing in the early season. Spring rains were quite abundant. Beets were grown for this factory in some districts where planting can be done as early as February. Considerable acreage was planted early, and in these fields thinning was in progress as early as April. Through this month rains were quite abundant. The stand of beets was good.

About 4,000 acres of beets were planted in the vicinity of the factory. Considerable acreage was planted in the vicinity of Anaheim and Orange and at other places some distance from the factory.

The company is experimenting in a new locality, near Thermal, where beets mature much earlier. If the beets prove of good quality, by planting sufficient acreage in this district the factory will be enabled to begin operations much earlier. This plant did not operate this season. The beets from this district, approximately 35,000 tons, were shipped to the plant at Oxnard, which belongs to the same company.

Los Alamitos.—The work of this factory has done much to revolutionize agricultural conditions in its vicinity. The farming area surrounding it was originally an immense sheep-grazing ranch. Seven years ago this factory was built. It started on its career reclaiming this wild expanse of grazing land. A large part of its beet-growing lands is now under irrigation, water being supplied from flowing wells. In the vicinity now are annually fed a large number of cattle and sheep for the Los Angeles market. The plant owns considerable acreage. It is also interested in the Bixby Land Company, which owns a large tract of land in this vicinity.

The waste molasses and pulp by-products are all utilized to the best advantage. The molasses is sold under contract to feeders, who mix it with their hay when it is stacked, where it is allowed to go through the sweating process and is afterwards fed. This seems to produce a very palatable and desirable feed.

The sugar company installed this season the osmose process for more complete extraction of sugar from the molasses. This will reduce this waste product to a small amount.

All crops in southern California during the latter part of the growing period were affected to a considerable extent by the hot dry weather. As most of the beet-growing plats of this district are irrigated, this drought did not affect the beet crop so much.

The general results of growing beets were satisfactory. Beets have always shown a very high quality here. During one week this season the beets received showed average sugar contents reaching almost to 19 per cent, with a purity over 83.

This district received a bountiful supply of winter rain, one downpour the latter part of December, 1904, amounting to 2.1 inches. Such a rain in the winter in this district means much for crops generally.

The farming district is using extensively for fertilizer, especially for fruit lands, the refuse lime cake produced by this factory.

OXNARD.—This factory had an unusually large supply of beets for this campaign. Many of these came from the Chino district.

As usual the sugar contents were very high, ranging from 16 to 17 per cent, while the coefficient of purity of beets averaged 85.

This factory has developed large feeding interests, the company being interested in a large ranch near-by on which it feeds several thousand head of cattle annually.

Owing to the hot, dry weather prevailing during the latter part of the growing season the average tonnage of beets was not up to standard; but this result was accompanied by a higher sugar content and purity, which offset to a considerable extent the lower tonnage.

The unfavorable season affected all crops, and comparatively the beet crop gave better results than the rest.

COLORADO.

Conditions throughout the State, both north and south, were exceptionally good during the past year. Farmers are demonstrating better adaptability to the work, and are producing more and better beets at less cost. There were some floods, insect attacks, and hail storms, with consequences somewhat local and not of general importance.

Indications point to considerable extension of the beet-sugar production in this State in the near future. At the present time the six northern plants in the State are associated together under one management. The same interests have organized the Great Western Sugar Company, with a capitalization of $20,000,000. This company proposes to put in several new plants in the State, three of which are already planned and settled for next year.

There has been a very remarkable growth of the stock-feeding interests of the State, and an especially noticeable and satisfactory increase in the use of pulp. All the factories in the State are now able to dispose of all the pulp at a good price. Several of them had to turn away large orders for this by-product. Appreciation of pulp feeding in Colorado has developed more quickly than in any other State manufacturing beet sugar.

It might be said that the industry itself has moved along more satisfactorily in this State than in any other. Conditions seem to be highly suitable to the industry wherever a factory has been built. The State is naturally proud of the industry, as there is every reason it should be.

As indicating the appreciation of the work done by the United States Department of Agriculture, I quote from an article in the Denver Post of January 1, 1905:

> Several years ago a man sat in his office in Denver and read a Government pamphlet on the beet-sugar industry. He had never been guilty of such a thing before. He never expected to be again. But he had already received several similar pamphlets, all about beet sugar, and he decided to wade through the subject and be

done with it. Instead, he waded through and began with it. The more he read the more he became interested. He sent back to Washington for more information. He got it—by the bookful. He went into a thorough personal investigation of the beet-sugar proposition. He was not afraid of a thing because it was new. All he cared about was whether it was a good business venture. He was a Westerner and the West takes chances and sees success a long way ahead. It is less hampered and broader visioned than the East. Therefore he invested in beet sugar.

That man was John F. Campion, the father of the beet-sugar industry of Colorado, that lusty infant that has shot up out of all proportion to the probabilities. Five years ago the first beet-sugar factory was built in Colorado. To-day in the production of sugar beets this State leads the country.

The following is a summary of the results for all the Colorado factories for 1904:

The average acreage of the factories was 4,939 acres.
The average yield per acre was 12.32 tons of beets.
The factories worked an average of 6,115 tons of beets.
They produced in sugar an average of 13,839,311 pounds or 6,919.65 short tons.
The sugar content of the beets averaged 15.64 per cent; the purity, 82.46.
The factories paid to the farmers for beets, approximately, $2,751,595.

Eaton.—The contracted area for growing beets for this factory was somewhat less than formerly. However, the farmers have received more training, and with favorable conditions the beet crop has been considerably more satisfactory.

Irrigation was aided in the early season by more than usual rainfall. Better results in beet crops were secured than in any previous year. Prospects are good for next year.

The Eaton Sugar Company's campaign lasted sixty-one days, and was most satisfactory in every respect. A very favorable season, resulting in a heavy tonnage per acre, a growing familiarity with the crop and the dying out of prejudices, an increased confidence in the sugar company and its methods, and low prices for other farm products all cause farmers to view the beet crop with more favor than ever.

A machine to dig and elevate beets where they were to be topped from a platform by hand was tried the early part of the season, but was not considered a success.

About 200 farmers grew beets for the factory. A price of $5 per ton at the factory or loaded on cars was paid for beets. Prospects could not be better and the factory anticipates a large acreage for next year.

Nearly one-half of the seed planted is the Original Klein-wanzlebener. The best results in growing beets come from a clay loam which has been in alfalfa and is then put into beets, followed by potatoes, then beets, then alfalfa again.

Fort Collins.—This plant secured an acreage sufficient for a full supply of beets. The season opened very auspiciously, indicating a bountiful supply of beets.

Arrangements were made with the Department of Agriculture for conducting experiments with soil fertilizers and in seed production to test conditions for producing home-grown seed, especially those with the single germ.

I have called attention in this report to the enormous increase of stock feeding in the State as a result of feeding by-products of the sugar factories. As an indication of the extent of this around this factory, I clip from the Beet Sugar Gazette, of January 5, 1905, in which a local paper of recent date is quoted as follows:

> The sugar factory has been compelled to turn away 35,000 head of sheep and 2,[illegible] head of cattle, because this year's supply of pulp had all been contracted for and is now being fed on or near the factory grounds. There are now on pulp and alfalfa ration on the factory grounds, and in pens near by, 17,692 sheep and lambs and 3,[illegible] head of cattle. Several shipments of sheep and cattle fattened on pulp and alfalfa have been made from the factory feeding pens in the last few days.

Near the close of the beet harvest the beet growers and their families were entertained by the factory management. This gave those interested in growing the beets for the factory an opportunity to witness the process of sugar manufacture, and, incidentally, to come into closer acquaintance with the factory management, all of which indicates better feeling between the two interests of the sugar industry.

GRAND JUNCTION.—This factory has been idle for two years. It secured acreage this season sufficient to furnish a full campaign. The beets were grown at various points tributary to the railroad delivering beets to Grand Junction. About 4,700 acres altogether were contracted.

The season was quite favorable. It is about three weeks earlier in the Grand River Valley than in any other part of the beet-growing area of Colorado.

While this factory has been operated through three campaigns before, many of its beets for this season were grown in practically new territory. The results have been very encouraging. It is safe to assume that the work of this year has placed this plant on a substantial basis among the successful plants of Colorado. Under the stimulus of its success this year it has arranged to double the capacity of the plant for next season. Work on this extension will begin immediately, in order to have it in readiness for the next campaign.

The factory is finding ready sale for its pulp, a large part of which is disposed of under contract to Goslim Brothers, extensive feeders. They are feeding at present 800 head of cattle and 15,000 head of sheep.

The campaign covered a period of one hundred and twenty days. The territory growing beets for the factory extends 104 miles east of Grand Junction, 17 miles west, and 98 miles south. The difference in elevation between the lowest and highest land which was in beets last season was about 1,500 feet. Consequently there is quite a variety of climatic conditions. The past season, however, has been quite favorable.

In public favor the beet crop has made a tremendous leap this season. When the company was reorganized in 1903 beet growing was in great disfavor among the farmers of this section. For several months it required the unceasing and untiring efforts of a number of experienced men to secure contracts for 4,000 acres; whereas now, after a short period of solicitation by the field superintendents, they have secured contracts for 4,500 acres for next year (the contracts being written for one year only). This great change in sentiment is due largely to the irresistible determination of the new company. Much is also due to the services of an efficient corps of field superintendents. Generally the district possesses an abundance of water for irrigation. The fulfillment by the company of every representation and agreement has added much to the general revival of confidence among the farmers.

Contrary to expectations, experience this year has shown generally that the beet crop in this section does not do well following alfalfa. This is observed almost universally in this locality. The opposite is true on the eastern slope of Colorado and throughout Utah and Idaho. Experience demonstrates here also that beets can be "irrigated up" successfully. The district planted about 3,700 acres, and of these 2,600 acres were "irrigated up." There has been an impression among agriculturists that attempts to practice this on a large scale would be disastrous.

The factory had 1,000 contracting farmers this season. It paid $5 per ton for beets delivered at the factory or the nearest shipping point.

It used Rabbethge & Giesecke's Kleinwanzlabener seed, Dippe Brothers' Elite Kleinwanzlabener, and C. Braune's Kleinwanzlabener seed, about as much of the first-named as of the last two together.

It is difficult to describe the lands in the territory, as they are quite variable. There may be three or four different soils in one field. Roughly, they may be divided into three classes: The red light loam on the mesas, the gray adobe (with variations) in the middle belts, and the dark sandy loam in the bottom. The red light loam raises the most shapely beets, and, in point of sugar and purity, the richest. The gray adobe soil produces good tonnage, but a short ill-shaped beet. The bottom land gives the heaviest tonnage, usually with comparatively good sugar content and purity.

GREELEY.—The season from the start was quite favorable to beet growing. The contracted area for growing beets was not as large as that of last year. It was estimated that the supply for the factory would probably be larger, from the facts that the factory had exercised considerably more care in selecting its growers, and that these were better accustomed to beet growing.

A flood during the summer destroyed a few fields. It is demonstrated that some lands not so favorable to potato production, which is the main crop of the district, are more productive in beet growing.

The quality of the beets for the season maintained the usual average, and the yield was larger than for any preceding year since the factory has been in existence.

The Greeley Sugar Company's campaign lasted seventy-five days, and was most satisfactory. About 412 farmers grew beets for the factory. The price for beets was $5 per ton at factory or loaded on cars.

Longmont.—The management of the sugar factory here gave more attention than usual to the selection of the beet growers, preferring those who by previous experience had demonstrated capabilities with this crop. The contracted area is not as large as last year, but the season proved very satisfactory and beet growing was quite successful. Prospects for next year are excellent.

Loveland.—This factory contracted for a full acreage this year. The plantings as a rule produced a good stand. The factory has now operated four years. Each of these has been quite satisfactory to all concerned. It has accomplished much in developing the facilities of the farming community in its vicinity. It has built and equipped a railroad 15 miles in length, especially devoted to its own uses. During the past season it extended this, built from it spurs and sidetracks, and also constructed several country dumps, where farmers can deliver their beets to the cars at short distances from their fields.

The farming area surrounding this district shared in the generally favorable climatic conditions which prevailed all through northern Colorado. Through rainfall and irrigation a bountiful supply of water was secured for all crops. The present year has been the best in beet cropping of any in the history of the factory.

Rockyford.—The season has been quite favorable throughout the beet-growing territory of this plant during the year. Heavy rains fell in June, very much increasing the moisture supply, which is generally secured from irrigation. An unusually large crop of beets was grown and delivered to the factory. These were of good yield per acre and high quality. The crop was threatened in its earlier stages more or less by worms, but the injury proved of little importance, and did not result in any considerable damage.

Every sugar plant requires overhauling during the summer, if for no other purpose than to effect the repairs, which are considerable. At this time most factories also receive considerable improvement by the installation of new and better features. During the season this plant installed steam power to take the place of electric motors formerly in use.

The factory started up the latter part of September. On account of excessive rains interfering with the harvest, it closed down for a few days, but resumed operations October 5. These rains occurring at the harvest had a tendency to materially lower the sugar contents of the beets for a couple of weeks.

SUGAR CITY.—Most of the land producing beets for this factory was plowed up in the fall. The plant owns about 12,000 acres; most of the beets are grown on its own land. These are leased to farmers for beet-growing purposes. Independent of this about 2,400 acres were contracted among 300 farmers. In all, 4,400 acres have been harvested. The factory paid $5 flat per ton for beets.

The plant has been experimenting with nitrate of soda as a fertilizer. Two thousand acres of the lands belonging to it were treated with this in preparing the land for the crop of 1904. In addition to the nitrate of soda, the company applied experimentally several different commercial fertilizers in order to demonstrate their comparative merits.

Stock feeding here has increased at a considerable rate, one company feeding 3,000 head of cattle. In this way the waste molasses and pulp by-products are disposed of.

The factory had a campaign of about one hundred and ten days. The past season was generally good for the beet crop in the locality. It grows in favor with farmers, especially those who have been successful. Encouraged by favorable results this year, they will grow beets more liberally next.

A new patented harvesting and topping machine was tried this season, but was not perfectly satisfactory in its work. The ground had to be in a particular condition; when the ground was a little too damp or too dry, it would not work satisfactorily; but, as all machinery of this kind is still in the experimental stage, the difficulties that have developed will probably be remedied. An implement of this kind is very much to be desired.

Irrigation is practiced generally in this semiarid region and, with sufficient water and the right kind of farming, beets are undoubtedly the most reliable and advantageous crop. The soil, quantity of water available for irrigation, method of cultivation, and particularly the energy and skill of the grower decide the issue of growing beets.

Land that has been in alfalfa for three or more years produces a satisfactory tonnage of beets. Fertilizers, outside of barnyard manure, are not resorted to, as a rule, in this part of the country except experimentally. Rotating with alfalfa will produce a satisfactory crop. The company had in one piece 481 acres of beets on land previously in alfalfa. This, the second year in beets, it yielded 10,100 tons, or an average of more than 20 tons to the acre.

WINDSOR.—The area planted to beets for this factory was somewhat less than that of last season; however, it produced quite a satisfactory supply for the campaign, which lasted fifty-five days. About 110 farmers grew beets for the factory.

There were early indications of the destructive effects of the army worm, which, however, were finally confined to small spots, not spreading much, the damage being much less than anticipated.

Last year labor troubles, here and at other places in the northern part of the State, were more or less prominent. These have adjusted themselves. Growers and day laborers are more generally satisfied with conditions.

Stimulated by the output of waste molasses and pulp, feeders have shipped into this place for feeding purposes 15,000 lambs and 150 head of cattle.

The season was highly favorable and satisfactory. Higher tonnage than last year was produced. Farmers are more readily signing contracts and placing more reliance in the beet crop. Potatoes, one of the principal crops upon which the locality largely depends, sold at a very low price.

The district was again given an illustration of the performance of sugar beets, following a very severe hailstorm. On July 4 it destroyed almost everything growing in the fields. It was especially severe on potatoes and small grain, but its effects on the beet crop were hardly appreciable. Coupled with this is the fact that the farmers are becoming more adept at growing beets, producing cheaper, with better yield. The relation between factory and farmer is that of mutual friendship.

During the harvest a beet topper was tried at this place, but without satisfactory results.

The factory pays a flat rate of $5 a ton for beets, the same as most of the other factories in the northern part of the State.

The rotation practiced is, first, potatoes, then alfalfa, then sugar beets.

IDAHO.

The State now has three sugar factories, two of them operating for the first time this season; the other completed its second campaign. In view of the fact that all of these factories are operating under undeveloped conditions, with new surroundings and with considerable inexperienced help, results were very satisfactory. There are prospects for one or two other factories in the State in the near future.

In the small towns and agricultural district tributary to these factories a remarkable improvement is to be noted. They are especially stimulating settlements and building and improvements in towns in which they are located. Following the sugar factories and benefiting by the conditions developed, there is a general advance in agricultural products generally.

General results of the State during the year may be summarized as follows:

The average acreage of the factories was 2,566 acres.
The average yield per acre was 9.81 tons of beets.
The factories worked an average of 25,166 tons of beets.
They produced in sugar an average of 5,865,100 pounds, or 2,932.5 short tons.
The sugar in the beets averaged 14.88 per cent, and the purity 83.52.
This year the factories of Idaho paid the farmers for beets approximately $377,500.

BLACKFOOT.—The factory was operated here this year for the first time. It has accomplished much in stimulating business interests. It has decidedly encouraged improvements, building business blocks and residences, etc. The growing period for beets was generally favorable and, for the first crop, was very satisfactory. Considering the district, the growing beets received considerable rain, which aided materially in their growth and development. The season continued very satisfactory throughout, the yields of sugar beets being generally good. Results of this year have done much to encourage the new industry at this place. Contracts for growing beets for the factory next year are already arranged for nearly twice the acreage of this.

IDAHO FALLS.—The early season started very favorably, producing a good stand of healthy beets.

Mr. Thomas R. Cutler, general manager of the Utah Sugar Company, with two factories in Utah and two in Idaho, is the “ father of the sugar industry ” in those two States. He began his career as a sugar maker with the commencement of the Lehi factory, fourteen years ago. Due to him more than any other person is the development of this industry in Utah and its commencement in Idaho. As to conditions prevailing this year in these two States, he makes the following report:

SALT LAKE CITY, *January 14, 1905.*

DEAR SIR: In response to your communication addressed to our agriculturist of the Fremont County Sugar Company, Sugar City, Idaho, as well as the one written to our agriculturist of the Utah Sugar Company, we have gone over these questions thoroughly, and the result of our investigations is as follows:

The location of the Fremont County Sugar Company is at Sugar City, Idaho. The location of our Idaho Sugar Company is Idaho Falls, Idaho. The former factory was in operation this season sixty-two days; the latter, fifty-eight days.

In Idaho, for the first time in twenty-one years, a severe frost occurred in the early part of June, and wheat that was quite high was bitten very severely. Young beets that were being thinned were also touched, but in every case where such beets were even burned black and were left in the ground they grew out again and made excellent crops. Some of the farmers, however, got frightened and replanted, and these did not do as well as those who left their crops in the ground. The farmers are very much encouraged, therefore, with the beet crop and believe that it is superior to any other crop that they can raise, as it will stand the frost better than grain.

In Idaho, which is a newer country than Utah, conditions are somewhat reversed. Farms are of much larger size, because of the country being as yet thinly settled, and this necessitates the employment of an army of laborers.

Until the Idaho Sugar Company commenced operations foreign labor had not been applied to any of the farming operations, but it became necessary, with the advent of the Idaho Sugar Company, to import Japanese laborers. In so doing it is an advantage to have large farms where gangs of Japs may be located permanently in the center to do the work; therefore the same conditions that apply to Utah do not obtain in Idaho at present, but as the State becomes more thickly populated farms will be cut up and the same conditions will ensue there as in Utah. The greatest consideration is the enormous quantity of available land and the supply of water, which is inexhaustible. There is perhaps no other State that is so rapidly coming to the front in agriculture as Idaho.

The number of contracting farmers was 350; the acres harvested, 4,650.

Fremont County Sugar Company has also built a slicing station 7 miles northwest of the main plant, where about half of the beets for that factory were sliced this season.

Yours, very truly, THOMAS R. CUTLER, *General Manager.*

SUGAR CITY.—The factory was operated at this place this year for the first time. Severe winds and heavy frosts injured crops generally in this section of the country. Beets demonstrated their superiority as a hardy crop by suffering the least damage of all. Generally speaking, this was small.

A special point of interest in connection with this plant was the wonderful revival of business activity it gave to the town, causing the building of residences, business blocks, new schoolhouses, opera houses, stores, etc.

The principal fertilizer for the beet crop is alfalfa plowed under with the green foliage during the summer season, the ground being planted to beets the following year. In this way it will enrich the land for a period of two or three years, and make it produce excellent crops if properly cared for. Then the crop may be changed to grain and alfalfa for a period of two years, and then prepared for beets again. In this way excellent results may be obtained. If alfalfa is plowed under, potatoes may be grown from the soil the same year. Barn-yard manure also gives excellent results when applied to the soil every other year; however, the alfalfa is the cheapest fertilizer. Clover is also very good for plowing under, and the same is true of peas. This question of fertilization is the most important one connected with raising sugar beets in the intermountain region, as the soils are not very rich in humus in their natural state. They can be fertilized with alfalfa as a green manure at an expense to the farmers of about $2 per acre, this being the cost of the seed necessary to plant an acre.

The Fremont County Sugar Company had 300 contracting farmers and 4,526 acres of beets were harvested.

MICHIGAN.

General climatic conditions in the State of Michigan, while a little changeable, were more favorable than usual. The spring was late, but finally opened up with fine weather, which continued during the early part of the growing season. There was plenty of rain, and it was quite evenly distributed. Immediately prior to and during the ripening of the beets and the harvest the weather continued dry. The ripening and harvest season was, as a rule, ideal. Compared with other crops, the beet crop should be considered quite satisfactory.

The most noticeable feature in connection with the industry in this State is the fact that the farmers are becoming better satisfied and more interested in the sugar-beet crop. The acreage for the factories, as a rule, throughout the State was considerably less than might be desired. This was compensated for to some extent by the unusually high quality of the beets and the better yield of the acreage planted.

There is quite a growing tendency on the part of feeders in the State to increase the use of pulp. The waste molasses of this State, as a rule, is disposed of to a Bay City concern for the manufacture of alcohol, the product being of unusual quality.

One factory was removed from the State to Wisconsin, two have ceased building while still uncompleted, and three others were idle. Stimulated by the general good feeling of the farmers and the largely increased acreage now secured, it seems quite probable at this writing that the idle ones will be in operation next year.

The results for the 16 Michigan factories which were in operation may be summarized as follows:

The average acreage of the factories was 3,361 acres.
The average yield per acre was 8.06 tons of beets.
The factories operating worked an average of 27,089 tons of beets.
They produced in sugar an average of 6,491,551 pounds, or 3,245.8 short tons.
The sugar in beets averaged 15.13 per cent, and the purity 85.47.
All the factories of Michigan paid the farmers for beets approximately $2,383,854.

Bay City.—Considering the capacity and the length of time this factory has been operated, the acreage planted to beets was not very satisfactory. Farmers were discouraged to some extent here, as in other places in Michigan, on account of the two previous unfavorable seasons. Generally the weather conditions proved quite favorable throughout the year, and the yields were much better than for some years. The quality of the beets also was higher than usual.

There are two plants at Bay City belonging to this company, distinguished one from the other by the names "Bay City" and "Michigan." On account of the small acreage planted and the consequent scarcity of beets, it was decided not to operate the Bay City plant, the Michigan working the beets grown for both concerns.

Owing to the generally good results of the beet crops as compared with other farm crops, farmers are taking considerably more interest. The company is receiving quite an increased acreage for next year. Applications for contracts for next year began to come in early, and the factory already has a large number. There is every indication that its beet acreage will be very much increased.

ALMA.—The plant at this place is one of the most successful bee sugar factories in the State. This year it underwent extensive repa and improvements.

The results of beet growing in this district were generally satis tory. (See Pl. III.) Like most other factories in the State, it failed t secure sufficient acreage to produce a full supply of beets. The cro planted were better cared for, and better results were obtained th usual. Farmers generally are more satisfied with beet grow Indications are that they will take more readily to beet produc than in the past. As with other factories in the State, contracts a being signed much more rapidly and to a larger extent, indicating full supply of beets for next season.

This season has been quite favorable; the beets have tested well an farmers are feeling more free to contract for the next campaign; st the crop is not thoroughly established with the farmers. It is gro ing constantly in favor and would grow much faster if it were not f the difficulties encountered in securing the necessary labor.

Many think the factories are requiring the farmers in this secti of the country to grow their beets with rows too close together. It i claimed the farmers have never been used to cultivating anything i rows as close as 20 inches, and that it causes them to do very slac slovenly cultivation with implements in use. Good authority i Michigan suggests that, if beets are put in early in rows 28 to inches apart, and thinned to 8 inches in the row, just as good resul will be obtained in tonnage and sugar as when they are sown clo together, and that the farmer will do much better cultivation, which means that the crop can be more cheaply raised by the average farmer

Experience with commercial fertilizers has been quite satisfactory. In some instances no benefit was noticeable, but in most cases the crops increased from 1 to 3 tons per acre. The beet-seed experiments conducted with American seed have shown very favorable results. Larger tonnage and higher sugar contents resulted from the use of American seed. This, of course, means better satisfaction to both the farmer and factory.

The factory had a machine made for the purpose of harvesting and topping sugar beets. It was the first attempt and it did not work well. It had only a short trial, as it was late in completion. It could pull the beets, but it is not a successful topper as yet. Another beet harvester was tried here this fall, and it worked fairly well, and gave evidence that after some more changes are made it may be a practical harvester.

The factory had about 1,000 contracting farmers. It generally uses three or four different kinds of seed, mostly the Kleinwanzlebener.

The prospects for next year seem more favorable than they were

PLATE III.

A BEET FIELD NEAR WHEELER, MICH.

for this year at its beginning. Good clay land generally gives the best results in growing the beets.

CARO.—Beet growing for this factory has been quite successful in previous years, as compared with that for other factories of the State. During the past two years there have been some discouragements, however. The springs have been wet, cold, and unfavorable, and there has been very wet weather at harvest time, the first interfering with the planting, germination, and early cultivation of the young beets, and the latter with the harvesting, causing considerable more expense. On this account the factory was not able to secure contracts for as large an acreage as usual. However, under the generally favorable climatic conditions of the season, a much better crop of beets was produced and a larger total yield was received in consequence.

CARROLLTON.—The plant at this place belongs to the same company as the one at Saginaw, in its vicinity. Its farming district grew considerable beets, but these were worked by the Saginaw factory. The season and the results of beet growing were quite similar to those prevalent in the beet-growing district of Saginaw.

CROSWELL.—This factory shared in the favorable conditions for growing sugar beets in the State. The factory did not secure a large acreage, but the land planted to beets, as a rule, received better cultivation. The beet crop generally was much better than at any other time during the operation of the factory. Farmers are much better satisfied and contracts are being signed for a considerably larger acreage next year.

The season has been very good for beet growing, with this exception: The spring was late, backward, and cold, most of the seed being planted about the 1st of June. The summer and autumn were normal. The seasons of 1902 and 1903 were very unfavorable for sugar-beet growing. For this reason many farmers were discouraged and contracts covered a smaller acreage for this year; but the results obtained by the farmers were generally very satisfactory and profitable.

A number of varieties of beet seed were planted, including domestic, grown in the State of Washington, supplied by the Department of Agriculture. This seed, in comparison with foreign seed, was very satisfactory in many ways.

Hill dropping seeders were tried; also blocking machines, but they are not yet satisfactory.

The number of farmers who contracted to grow beets for the factory this year was 650. The factory paid $4.50 per ton for 12 per cent beets, with a corresponding increase or deduction of 33⅓ cents per ton for each per cent of sugar more or less.

Prospects are good for 1905. Farmers are contracting freely, and all have prepared their land in the autumn for the crop.

The seed planted consisted of Mette's Elite, Jeansch's Victrix, Knauer's Mangold, and Hoerning's Specialital in about equal proportions.

Growers get best results on well-drained, fertile, fall-plowed black ash and elm land, which is a dark clay loam with a blue clay porous subsoil.

East Tawas.—The district around East Tawas shared the generally favorable climatic conditions for growing sugar beets. Crops, during the growing season, were much better cared for, and responded with much better results than hitherto.

The plant has a capacity of 600 tons. The campaign this year was a very short one, being even shorter than that of a year ago, owing to the limited amount of sugar beets received from the small acreage planted. A year ago (1903) the season was very unfavorable and the fall a wet one, the ground freezing up early in November. Some beets were frozen in the ground and those which were harvested had a great deal of earth frozen on them, making the tare very heavy. This, of course, was very unsatisfactory to the farmers; and added to this was the fact that the early appearance of frost prevented fall plowing to any great extent; consequently much of the land was not prepared for sugar beets until spring. Another reason for the small acreage was that the very heavy snow during winter prevented the sugar-beet agents from getting around among the farmers and procuring the contracts. The late disappearance of the snow in the spring, together with the rains that came during the period, left the land in bad shape for early planting with the result that much of the sugar-beet acreage was planted altogether too late. After the beet seed was in the ground, heavy rains followed, then dry weather came, packing the ground, retarding the growth of the beets, and preventing development. However, with a dry fall, tare was very light and the percentage of sugar was very good. This produced a better feeling among the farmers, although the tonnage was light.

No experiments with fertilizers were made to any extent, and the few fields treated were drenched with the rains, and, being somewhat rolling, the effect was lost to a great extent.

Contracts for growing beets were made with 450 families. The factory paid $4.50 per ton, delivered, with an addition of 33⅓ cents for every 1 per cent over the 12 per cent standard.

The kind of land which produces the best beets in this locality, one year with another, is the clay loam that is well drained. This year some of the best results were obtained from sandy loams, and even sandy loams of light nature. While the tonnage on these lands was not what it should have been, it was better than on some of the heavier flat lands not properly drained.

Taking it as a whole, this has been a very poor season in this locality, caused largely by one extreme following another.

Holland.—Beet growing around this factory was very satisfactory during the season of 1904. The factory received contracts for sufficient acreage; early weather conditions were favorable, producing a good stand. The farming community is made up of people of the frugal industrious German type. Apparently it has been one of the most successful factories operating in Michigan. The plant during the summer underwent considerable improvement, especially in the addition of two large beet sheds, materially increasing the storage capacity of the factory. For 1905 prospects are good.

Lansing.—The opening of the season was more favorable this year. The management secured a larger acreage than last year. There was considerably less difficulty in securing labor to do the work in the field. This, with the better yields from the fields, has materially aided the factory in securing contracts for much larger acreage next year.

Marine City.—This plant secured a much larger contracted area for growing sugar beets than last year, approximating 3,000 acres. The weather conditions were somewhat unfavorable the latter part of May and the first part of June. Considerable rain, followed by cold weather, interfered with planting and early cultivation. Through it all the farmers generally secured a good stand, and the weather was quite favorable for cultivation during the months of June and July. This continued up until the harvest was well under way. About the middle of October heavy rains fell; this retarded the work of harvesting and materially affected the sugar contents of the beets for a week or ten days thereafter, after which time better climatic conditions prevailed, and the beets soon assumed their former high sugar contents.

One of the features of beet growing in this vicinity is the interest taken by business men in the beet crop. At this place a club was formed, and a field of 460 acres planted to beets. These were grown under the direction of an expert, the beets were cultivated with care, an excellent stand was secured, and a very satisfactory crop of beets grown.

Menominee.—This factory succeeded in almost doubling its beet acreage this season. The early part was very favorable, and the stand generally good. The season continued normal throughout. The factory received a satisfactory supply of beets. Farmers are generally satisfied with the yield. General results of the year have done much to place the plant on a more substantial basis for future operations. During the summer it received considerable repairs and improvements, especially an increase of the storage facilities for beets.

The normal capacity of this factory is 1,000 tons of beets per day. Several times during the campaign it exceeded this capacity 100 tons or more.

Last year the factory inaugurated the policy of entertaining at the factory its beet growers one day during the campaign. Of these, 3,000 assembled this year, examined the machinery of the enormous plant, saw it in operation, and participated in a general revival of interest. For a new district, the capacity of the factory is a little large. To run this factory 100 days will require about 100,000 tons of beets.

For next year the company has put out a more liberal contract. I am informed that the seed is to be furnished free to the farmers at the rate of 18 pounds to the acre. This is done in order to encourage planting sufficient seed to secure a stand. Where the farmer has to buy the seed there is a tendency to economize in the amount planted. The company agrees to pay the farmer $4.75 a ton for beets delivered in the county. The Menominee River Sugar Company will give away as prizes to sugar-beet growers who raise beets for them 5,000 pounds of granulated beet sugar. All persons growing sugar beets for the company under contract are entitled to compete for the prizes as follows:

For field of 5 acres or more:

First prize—300 pounds of granulated beet sugar: To be given to the grower whose beets bring the largest return in money per acre before anything is taken out for freight or seed.

Second prize—250 pounds of granulated beet sugar: To be given to the grower whose beets bring in the second largest return in money per acre.

Third prize—150 pounds of granulated sugar: To be given to the grower whose beets bring the third largest return in money per acre.

For a field of 2 acres or more, and less than 5 acres:

First prize—200 pounds of granulated sugar: To grower whose beets bring the largest return in money per acre before anything is taken out for freight or seed.

Second prize—150 pounds of granulated sugar: To grower whose beets bring second largest return per acre.

Third prize—100 pounds of granulated sugar: To grower whose beets bring third largest return per acre.

Special prizes will be given to growers in each county from which sugar beets are shipped to this company during the year. All persons growing 2 acres or more of sugar beets under contract for the Menominee River Sugar Company are entitled to compete for these prizes as against all other growers in the same county, prizes to be awarded according to the return in money per acre for fields of 2 acres or over. The special prizes are as follows:

First prize—150 pounds of granulated sugar.

Second prize—100 pounds of granulated sugar.

Third prize—50 pounds of granulated sugar.

All persons who wish to compete for these prizes must notify the company not later than July 1. An agent of the company will call upon those who wish to compete for the prizes and will measure their fields to find out the number of acres contained. The prizes will be awarded on the basis of the factory weight and test of the beets when delivered to the company.

Any grower may compete for the general prize and the county prize also, but both prizes will not be awarded to the same person. The prizes will be awarded as soon as all the returns from the beets can be figured over at the end of the season. Persons who wish to compete and have not contracted for enough acreage may increase their contracts so that they will be entitled to compete at any time before planting. In each case the crop from the whole field will be taken into consideration.

Mount Clemens.—The season was unusually favorable in this district. It produced the highest average tonnage of any factory district in the State. It had quite a large acreage, and bought several thousand tons of beets grown for the factory at Rochester after that company determined not to operate.

It also had the longest campaign of any factory in the State, the longest in its history. Farmers are very well satisfied with results and are contracting for larger acreage for next year. It is probable that this factory has passed beyond the stage of pioneer difficulties, and that in future it has only to meet those due to abnormal seasons.

Owosso.—The early season was quite favorable. The stand of beets was generally good. Later it was very dry; and it is claimed there was not one month in the year in Shiawassee County that there was not some frost. The rain in the fall helped the crop materially, and it matured very much beyond expectation. Good results in beet growing have done much toward encouragement. The better results are not all attributable to this fact, however. Much is due to the more conservative policies based on past experiences. The factory management insisted on better farming. Road improvement and other facilities are receiving attention.

The harvest of beets was attended with considerable satisfaction throughout the growing area, the farmers receiving the highest average tonnage of any year. Farmers are signing contracts readily for next year. Prospects are bright for a good acreage next year. The farmers are all very much interested and their general talk is favorable to the beet crop.

Experimental work in planting beets in rows 28 inches apart generally demonstrates that they produce as large tonnage at not more than two-thirds the cost.

Experimentation in this district with American-grown seed indicates strong germination, but it is claimed the per cent of sugar was a little lower than that of beets from foreign seed. The tonnage averaged about the same.

A patent blocker tried last year gave very good satisfaction. On one particular field it showed a very good improvement over the hand work. It is also used as a cultivator.

The campaign of the factory lasted forty-three days. The number of contracting farmers was 1,424. The number of acres harvested was 4,902. The price is based on $4.50 for 12 per cent beets with 33⅓ cents for each 1 per cent above that. The average price paid the farmers last year was $5.69.

Experiments with fertilizer have been conducted. It is claimed that where the land is rich and in proper shape fertilizer is of no use except to give beets an early start. The land giving the best results was a clay loam. A fertilizer experiment was conducted on 107 acres, using from 150 to 200 pounds of fertilizer containing 4 per cent nitrogen, 8 per cent phosphoric acid, and 7 per cent potash. The rows were 28 inches apart. The grain drill was used with the fertilizer attachment.

An experiment to test the proper distance between beet rows was conducted as follows: A 5-acre plot in the center of a 15-acre field was planted with rows 20 inches apart. On either side of this plot 5 acres were planted in 28-inch rows. The same fertilizer and same seed were used. The 20-inch rows cost 94 cents per acre more to cultivate and $7.47 more for blocking and thinning and hoeing than did the 28-inch rows. The average yield per acre for the 20-inch rows was only 46 pounds more than for the 28-inch rows. The average of the 28-inch rows was 10.93 tons of clean beets per acre. According to results here and at other places in Michigan, it is a serious question whether or not the directions for spacing beet rows, given by the best German authorities, are applicable to this locality. Further experiments along this line will follow.

ROCHESTER.—It was determined early not to operate this plant during this season. Considerable acreage of beets, however, was planted. Results were quite favorable. The beets were disposed of to other factories.

It is quite probable that the Rochester plant will be revived and placed in operation for next year. Many farmers and business men have felt its loss keenly, and are making endeavors to induce the company to operate it. Since the loss of its activity has stirred up so much local interest it is probable that when it starts up again the plant will be on a much better footing locally, and that it will continue a career of usefulness with plenty of beets. As indicating the latest movements among those interested, I publish an extract from the Pontiac (Mich.) Press, of December 19, 1904:

> The Rochester Beet Growers' Association held its adjourned annual meeting in the town hall Saturday afternoon, and at that time it was decided to make a final effort to secure the required acreage for the reopening of the plant of the Detroit Sugar Company at Rochester.
>
> The new officers elected by the association are as follows: A. L. Ross, president; H. F. Stone, secretary; H. Wattles, treasurer; L. E. Becker, Troy; J. E. Toles, Avon; Thomas Farmer, Washington; William Cundy, Shelby; and George Sweitzer, Oakland, vice-presidents.
>
> H. F. Stone presented a petition from Rochester business men which asked the association to do everything possible to secure the reopening of the sugar plant. The petition was accompanied by a subscription from business men amounting to $510, which is to be used in defraying the expenses of the association in securing contracts for beet acreage.
>
> The communication from the Detroit Sugar Company set forth that the plant will be reopened if the association will guarantee 4,500 acres of beets for the 1905 run. The association has the assurance of 2,500 acres which will be grown near Blissfield. This leaves 2,000 acres to be grown in the territory covered by the 50-cent freight rate from the Rochester plant. This district extends north to Lapeer, south to Royal-

oak, east to Romeo, and west to Pontiac. Beets grown within this district can be shipped to the factory at a freight rate of 50 cents per ton.

Enthusiasm was manifest at the meeting and 137 acres were pledged among the 50 members present. It is estimated that contracts for at least 400 acres can be secured in Troy township. A feature of the meeting was the addresses given on the subject of beets. It was shown that in the five years beets have been raised in Michigan the first two years were unfavorable to the crop and the last three more favorable. The crop has increased in the output per acre and the beets have increased in the percentage of sugar which they contain.

The association will endeavor to hire men at once who will begin a canvass among farmers to secure contracts for acreage. It is expected that another meeting will be held the last of the present week.

ST. LOUIS.—Favorable climatic conditions tended much to better beet crops in the vicinity of this factory. While the acreage was less than in former years, the beets were better both in yield and quality. The fields were better taken care of, showing that farmers are gradually becoming accustomed to this crop.

SAGINAW.—The company operating this plant adopted the policy this year of materially increasing its list of farmers contracting to grow beets and advising them, as a rule, to plant less acreage. This is much more satisfactory, as each farmer with smaller plats of beets can handle the same better, produce relatively larger tonnage with the help at hand, and become more inured to the crop. If this policy could be adopted throughout the State of Michigan it would have a salutary effect. It would be much better, if possible, to confine beet growing to smaller plats and increase the number of farmers engaging in the same.

The yield of beets in this vicinity, although the acreage grown for the factory was much less than desirable, has stimulated a large number of farmers to apply for contracts for next year. The contracts at the close of the campaign were very much in excess of any ever obtained before. It is anticipated now that sufficient acreage will be planted to operate both factories located at this place and owned by this company.

The past season was not particularly favorable for beet growing in this locality. The planting season being very dry, the germination of the seed was low, and the early growth of the beets was stunted. The midsummer was quite favorable, but the cold weather in August and September deterred the growth very materially. While causing a high percentage of sugar, the cold weather matured the crop before it was fully grown, thus reducing the tonnage. Owing to the two previous extremely wet seasons, there was little or no fall plowing done in 1903, leaving the entire work of plowing and fitting the ground for last spring. This made considerable of the planting very late. The beets this season, however, tested better than in previous years.

The beet business is growing in favor with the farmers surrounding the factory, and apparently it will only be a short time when all of the good farmers will be growing beets. The profits derived from the sugar-beet crop, its durability through adverse weather conditions, and the great benefits of beet pulp for feeding, are influencing the farmers to grow beets. The more familiar they become with the beet crop the more friends it has. They are learning how to properly prepare the ground, plant and cultivate the crop, and the results are more favorable each year.

There is very little fertilizer used in the territory growing the beets. That used is principally barnyard manure, and clover as a green manure; however, in some cases commercial fertilizer has been used with very good results. This company used 100 pounds of nitrate of soda per acre this year on 28 acres of land. This was applied at three different times, and the results were most favorable, giving a large tonnage and also a high sugar percentage. This field of 28 acres averaged over 15 per cent sugar.

It also planted some of the home-grown seed and made a test of it in comparison with Hoerning's Kleinwanzlebener seed, without any particular difference at harvesting time, both running about the same tonnage per acre and about the same average sugar percentage. However, there was a considerable difference in the germinating power in favor of the home-grown seed. It was much more rapid and grew the plants more quickly at the beginning. It is probable that the company will make a more thorough and practical test of this seed another year, as it appeared much nicer, brighter, and more uniform than that from Germany.

The regular seed used is Hoerning's Kleinwanzlebener. It is intended, however, for the next campaign to try several of the leading varieties to determine for a certainty the best adapted to the soil and local conditions. Some beets from Hoerning's seed this year tested from 18.5 to 21 per cent sugar. These are especially good results for the district.

The company had 1,580 contracting farmers. There are two different classes of contracts: (1) To pay $4.50 per ton for 12 per cent beets and 33⅓ cents additional for each per cent over 12; (2) to pay a flat price of $4.75 for beets delivered to railroad stations, or $5 per ton for beets delivered at the sheds.

The prospects for 1905 are brighter than they have ever been since the factory started. It had, as early as the middle of December, as many contracts written for next year as it had altogether for the previous year.

Clay loam and clay produce the best results in the beet-growing territory. The great drawback to beet growing has been that the farmers have not secured large enough yields. A thorough canvass of the territory was made early last fall; every farmer was urged to fall plow some land preparatory to next year's planting. If he decided to grow beets this would give suitable and desirable land for the purpose.

For five seasons past a large part of the labor in the beet fields of the Caro section has been done by Russian laborers, brought here for the season from Nebraska. They gave such good satisfaction there that last season 10 or 12 carloads of 40 persons each were brought to the Saginaw Valley, and this season 15 carloads were brought here. The number of Russians to be employed in the valley next year will probably be still larger on account of the increased acreage expected. These Russians contract to take care of the beets, doing all hand work, for $20 per acre. They do no machine or team work, only the hand work. Manager Ewen, of the Saginaw Valley Sugar Company, states that they have given good satisfaction here. The 15 carloads this year were distributed through the factories at Saginaw, Sebewaing, East Tawas, and Croswell.

SALZBURG.—The German-American Company is probably the most successful in securing a supply of beets of any of the half dozen factories in the vicinity of Bay City. It is organized on the cooperative plan. Most of the farmers growing beets for it are stockholders in the concern. Its operations in Michigan have proven the cooperative plan to be a good one, especially in localities where competition for the beets is strong. A farmer is more likely to stick to the factory in which he is financially interested. This company secured contracts for a larger area to be planted in beets than for some time. As related to its capacity it probably had a larger supply of beets than any other factory in the State.

The climatic conditions of the season were conducive to the production of a good beet crop and good quality of beets. Results were more generally satisfactory than during any other season since the plant has been in operation.

A large warehouse for storing sugar having a capacity of 3.000 tons of sugar was constructed by this plant.

Often at the time when the beet-sugar factories are in operation prices of sugar tend to fall. In order to benefit by better prices, storage facilities become very desirable. Without them the sugar must go onto the market regardless of the prevailing price. Arrangements for storing sugar should be made by every factory in the United States.

SEBEWAING.—This factory had a larger acreage this year than ever before. It has been more favored in supply of beets than most factories in the State. Having secured contracts for a large area to be planted to beets this year, and the season being generally favorable for beet production, its supply was more than usually satisfactory. The farmers are more contented with the crop. Indications point to greater stability in the operations of the factory in the future.

Encouraged by the present improved conditions, it is announced that the factory will install a plant for drying pulp for next season.

The Sebewaing Huron Company had a sixty days' campaign this year. The season was dryer than in past years, and the total tonnage less, but the average per acre was better and the percentage of sugar higher. Good satisfaction prevails among growers, and labor is more plentiful.

The factory has about 1,200 contractors, and 3,600 acres were harvested this year. It paid $4.50 for beets testing 12 per cent, and 33⅓ cents per ton more for each 1 per cent of sugar above 12 per cent, with an equal deduction for same rate of decrease.

Prospects for 1905 are better than ever before. The company anticipates contracts for about 5,000 acres.

Hoerning, Dippe, and Original Kleinwanzlebener are the varieties of seed used.

The best results come from heavy clay-bottom soils, which are loamy on top, making a good seed bed.

West Bay City.—This factory made more of an effort this year to secure contracts with the farmers for a supply of beets. Hitherto it has depended more or less upon farmers to supply it with beets without contracts. This has not usually resulted in a supply sufficient to operate a long campaign. The generally favorable climatic conditions and additional contracts produced for the factory a supply considerably larger than that of 1903. The yield of sugar beets in the vicinity this year has been good. Contracts are being sought by the farmers. Every indication points to a very largely increased acreage.

MINNESOTA.

The progress of the single factory in this State is so marked that it seems unnecessary to discuss conditions except to note its general progress. The general average of beets was 12.32 tons per acre; the average sugar in the beets 15.6 per cent; the average purity 86.

It can readily be seen from these data that conditions are quite favorable for both the farmers and the factory.

St. Louis Park.—Although this factory enjoyed a very favorable season last year, results for this year are better. The factory secured sufficient contracts to insure a full supply. The season has been remarkably favorable throughout. In its early history this factory had to contend with many things. It was especially difficult to procure sufficient acreage. This obstacle has now been overcome, and the factory is able to secure the choicest land in the State for beet growing. The results of beet growing in the past year are the best of any in the history of the plant.

This year a cyclone partially demolished the plant, damaging it to the extent of $25,000, and this a short time before the opening of its campaign.

In former reports I have called attention to the progress of this factory as it gradually changed from distant or undesirable districts to those nearer home and from the poorer lands to the best. From year to year the tonnage has been rapidly increasing, as well as the quality of the beets.

The experience of this factory, beginning in 1898, may well be taken as exemplifying the progress of the beet-sugar industry in general during the period it has been in operation. As illustrating the gradual improvement of conditions, I clip from the Minneapolis Tribune of January 13 the following:

> It has been found by experiment that beets grow best in the sandy loam characteristic of the southern and southwestern parts of the State, and an effort was made last year to centralize beet culture in this section. That this has proved successful is shown by the fact that, although the acreage this year was 20 per cent less than that of 1903, the production of beets was much greater.
>
> During the year the beets yielded an average of 15.5 per cent of sugar, their range being from 14 to 17.75. In former years the crushing season at the mill has closed about January 1, but this year it will continue until the last of that month. This is due to the increase in the amount of sugar to be milled, and shows that the new industry is rapidly becoming one of the most important in the State.

STATISTICS OF BEET GROWING IN MINNESOTA IN 1904.

Through the kindness and courtesy of Mr. F. W. Fink, president and general manager of the Minnesota Sugar Company, I am enabled to include in this report the following instructive statistics of beet growing in Minnesota for 1904.

The last of these tables shows the remarkable success achieved by a large number of the beet growers. It will be noted that most of these results have been secured by farmers who only attempted to grow small acreage, a point which I have always emphasized. From the data furnished by Mr. Fink, I have computed the acreage results appearing in the last two columns of the last table.

Mr. Fink's letter and accompanying tables follow:

St. Louis Park, Minn., *January 28, 1905.*

Dear Sir: Pursuant to our previous correspondence and also to our conversation at the time you visited our factory last fall, I inclose herewith copies of extracts from our authentic beet records.

As you will notice, these statements give the total amount of beet shipments received by us, arranged according to shipping points of the different railroads contributory to our factory, a summary of the total shipments over the different roads, the total amount paid to farmers for beets, and the total amount paid to railroad companies for freight on the same. The difference between gross weight and net weight constitutes the tare (representing dirt and insufficient topping), which, as you will notice, has in most cases been less than 7 per cent, against 9 and 10 per cent in previous years.

I also inclose a statement of these shipments arranged according to counties in which these beets have been produced; also a statement of the results obtained by a large number of the most successful farmers in different beet-growing districts of Minnesota, which, as you will admit, have been most excellent compared with those of previous years.

I hope that these documents will be of some value to you in compiling your report, and in case you desire any additional information be good enough to advise me to that effect.

Very respectfully, yours,

F. W. Fink,
President and General Manager.

Mr. C. F. Saylor,
Des Moines, Iowa.

Beet shipments received by the Minnesota Sugar Company during the campaign of 1904 over several lines of railway.

THE "SOO" LINE.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
		Tons.	*Tons.*	*Acres.*		
Hamel	10	223	203	18½	$911.43	$136.56
Loretto	2	28	27	2	121.86	17.50
Rockford	1	10	9	1	41.68	11.50
Maple Lake	3	90	83	5	375.09	61.71
Annandale	28	695	643	51¼	2,885.21	566.27
South Haven	9	225	210	17	942.78	180.75
Kimball Prairie	12	316	293	29	1,320.82	253.78
Watkins	13	411	372	31¼	1,680.38	323.91
Eden Valley	17	460	425	36	1,917.71	350.47
Buffalo	4	91	89	5	392.25	65.45
Total	99	2,549	2,354	196	10,589.21	1,967.90

CHICAGO, MINNEAPOLIS, ST. PAUL AND OMAHA RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Nichols	2	41	38	2	$174.62	$24.80
Belle Plaine	9	205	190	18	881.49	124.26
East Henderson	5	102	94	8	426.03	71.24
St. Peter	5	68	65	5½	296.01	64.01
Caroline Siding	1	31	29	2	133.03	26.74
Traverse	1	20	19	1½	85.52	25.80
Oshawa	5	101	95	8	429.52	131.80
Courtland	1	16	15	1	68.25	23.00
Cambria	3	83	78	5	353.55	109.07
Judson	8	181	172	5	803.55	208.20
Spring Valley	1	19	17	1	78.66	21.19
Menominee Junction	1	30	28	2	128.48	28.00
Weston	1	22	21	1½	95.42	25.30
Beldenville	3	66	61	4	277.46	47.17
Deer Park	2	31	28	3	130.66	28.50
Total	48	1,016	950	77½	4,362.25	960.07

CHICAGO, MILWAUKEE AND ST. PAUL RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Chanhassen	1	19	18	2	$83.35	$9.80
Benton Junction	1	19	18	2	83.57	9.83
Cologne	8	218	200	15¼	905.83	108.61
Bongards	11	258	239	22	1,079.56	137.09
Norwood	5	98	92	6	416.36	64.00
Plato	3	76	72	7	326.32	50.31
Glencoe	74	1,726	1,620	119¼	7,297.32	1,035.86
Bigstone City	8	204	197	18	896.08	271.88
Biscay	3	60	56	6	254.37	43.56
Minnehaha	2	45	42	5	200.95	15.88
Mendota[a]	23	500	461	33	2,076.85	293.89
Westcott	9	174	162	17	731.51	33.05
Rosemount	1	22	21	2	93.90	13.82
Castlerock	2	48	44	4	201.60	28.76
Dundas	1	21	20	2	90.15	12.96
Medford	23	426	403	35	1,816.05	296.19
Owatonna	19	396	366	33	1,650.03	337.15
Vermilion	3	50	47	4	215.21	34.05

[a] Two carloads of the 23 were shipped via the Chicago, St. Paul, Minneapolis and Omaha Railway.

Beet shipments received by the Minnesota Sugar Company during the campaign of 1904 over several lines of railway—Continued.

CHICAGO, MILWAUKEE AND ST. PAUL RAILWAY—Continued.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
		Tons.	*Tons.*	*Acres.*		
Lakeville	8	42	40	4	$180.44	$27.37
Elko	18	400	374	34½	1,630.29	241.80
Lonsdale	35	713	677	68	3,227.22	505.47
Lesueur Center	48	1,180	1,072	82	4,913.85	813.02
Hastings	2	38	36	2	160.31	23.50
Hutchinson	14	271	252	22½	1,139.89	189.98
Total	317	6,989	6,520	546½	29,718.80	4,677.01

NORTHERN PACIFIC RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Forestlake	3	85	80	8	$361.03	$67.32
Littlefalls	6	113	106	22	481.11	118.05
Flensburg	8	204	189	40½	853.78	223.73
Total	17	402	375	70½	1,695.92	409.10

MINNEAPOLIS AND ST. LOUIS RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Waconia	35	984	810	96	$3,265.75	$446.45
Young America	19	454	422	34½	1,899.73	272.41
Hamburg	8	190	179	13	806.05	114.47
Green Isle	2	38	36	3	163.85	23.83
Arlington	38	1,075	987	98½	4,444.52	645.84
Gaylord	14	352	317	40	1,429.84	250.08
Winthrop	10	221	208	20	888.11	155.25
Gibbon	1	29	27	2	120.41	20.32
Morton	10	237	224	19	1,008.08	201.86
Lafayette	5	85	79	8	359.61	59.21
New Ulm	8	173	163	18	738.07	147.74
Hanska	7	156	147	15½	661.15	142.71
Chaska [a]	68	1,570	1,468	110	6,611.97	785.08
Carver	14	348	323	26½	1,454.99	174.03
Merriam Junction	22	574	509	55	2,461.47	287.04
Jordan	15	316	297	25	1,339.08	194.74
Helena	8	129	120	11	540.73	77.64
New Prague	64	1,629	1,513	105½	6,818.78	978.56
Suchomels Crossing	69	1,930	1,795	144½	8,401.40	1,195.04
Montgomery [b]	180	5,263	4,928	318½	22,682.13	2,842.80
Mulfords	32	759	717	59	1,068.66	158.79
Kilkenny	20	513	479	42½	2,163.89	360.62
Waterville	10	202	196	17½	857.12	145.75
Total	654	17,227	15,973	1,267½	70,155.99	9,674.57

CHICAGO, BURLINGTON AND QUINCY RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Maiden Rock	4	101	95	6½	$430.28	$81.94
Pepin	3	59	55	6	251.73	70.38
Total	7	160	150	12½	682.01	152.32

WISCONSIN CENTRAL RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Glenwood	4	53	49	5	$222.69	$52.57
Downing	2	39	36	2½	163.96	40.70
Forrest	2	19	17	2	80.17	28.34
Total	8	111	102	9½	466.81	121.61

[a] Of the 68 carloads 33 were shipped via the C., M. & St. P. Rwy.

[b] Of the 180 carloads 7 were shipped via the C., M. & St. P. Rwy.

Beet shipments received by the Minnesota Sugar Company during the campaign of 1904 over several lines of railway—Continued.

GREAT NORTHERN RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
		Tons.	*Tons.*	*Acres.*		
Long Lake	6	134	125	10½	$561.35	$93.25
Maple Plain	4	128	120	10	544.16	79.86
Delano	5	70	55	6	251.04	50.67
Montrose	2	27	25	2	115.85	22.40
Cokato	20	553	512	40½	2,306.42	332.90
Dassel	55	1,737	1,629	127	7,174.21	1,364.50
Darwin	14	273	257	19½	1,159.33	271.98
Litchfield	4	83	72	8¼	348.65	68.98
Grove City	1	15	14	1¼	60.66	13.09
St. Bonifacius	1	10	9	1	42.02	11.50
Maple	23	645	599	50	2,698.40	444.08
Mayer	13	305	282	21½	1,281.41	255.67
Silver Lake	7	100	93	6	424.35	93.27
Bock	1	21	19	1½	90.82	17.22
Mora	1	19	17	1½	79.55	18.72
Robbinsdale	5	143	139	9	643.47	86.18
St. Michaels Station	5	98	91	7	411.08	72.16
Nelson	3	56	52	4	235.57	72.62
New Germany	2	41	39	4	175.91	29.76
Total	172	4,458	4,149	330½	18,606.25	3,399.30

CHICAGO GREAT WESTERN RAILWAY.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
Empire	1	27	26	2	$115.05	$18.82
Dodge Center	1	20	18	1½	81.88	19.18
Waltham	2	115	109	7	497.54	136.57
Mayville	2	29	28	2	134.26	36.44
Morristown	3	77	71	7¼	323.46	56.90
Elysian	12	254	242	22½	1,068.95	246.60
Eagle Lake	....	18	17	11½	80.80	18.55
Madison Lake	4	80	76	5½	342.27	76.27
Simpson	5	122	114	8	515.02	136.32
Faribault [a]	22	415	391	40½	1,757.89	314.41
Mankato [b]	28	588	551	45½	2,477.76	507.32
Total	84	1,745	1,643	143¼	7,394.88	1,567.38

DELIVERED BY WAGON.

Name of station.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
St. Louis Park and vicinity	....	225	211	20	$1,057.80	....

[a] Of the 22 cars, 2 were shipped via the Chicago, Milwaukee and St. Paul Railway.
[b] One car of the 28 was shipped via the Chicago, St. Paul, Minneapolis and Omaha Railway.

Summary of beet shipments received by the Minnesota Sugar Company during the campaign of 1904.

Railway.	Land in beets.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Amount paid for beets.	Freight paid.
	Acres.		*Tons.*	*Tons.*		
Soo Line	196	99	2,549	2,254	$10,589.21	$1,967.99
Chicago, Minneapolis, St. Paul and Omaha	77½	48	1,016	950	4,362.25	960.07
Chicago, Milwaukee and St. Paul	546½	817	6,969	6,520	29,718.80	4,677.01
Minneapolis and St. Louis	1,267½	654	17,227	15,973	70,155.99	9,674.87
Great Northern	330½	172	4,453	4,149	16,606.25	3,399.30
Chicago Great Western	143½	84	1,745	1,643	7,394.88	1,567.38
Chicago, Burlington and Quincy	12½	7	160	150	682.01	152.32
Wisconsin Central	9½	8	111	102	466.81	121.61
Northern Pacific	70½	17	402	375	1,695.92	409.10
St. Louis Park—wagon deliveries	20	....	225	211	1,057.80	....
Total	2,673½	1,406	34,877	32,427	144,729.92	22,929.35

Beet shipments received by the Minnesota Sugar Company during the campaign of 1904, by counties.

County.	Number of carloads.	Gross weight of beets.	Net weight of beets.	Land in beets.	Amount paid for beets.	Amount paid for freight.
		Tons.	*Tons.*	*Acres.*		
Carver	203	5,144	4,679	403	$20,760.67	$2,832.58
Sibley	79	2,022	1,859	184½	8,304.25	1,290.82
Renville	10	237	224	19	1,008.68	201.86
Nicollet	17	290	273	23½	1,238.91	304.00
Brown	18	412	388	83½	1,752.77	299.52
Scott	127	3,048	2,843	231½	12,840.83	1,779.68
Lesueur	371	10,101	9,428	631½	41,176.00	5,757.53
Stearns	12	316	298	29	1,320.82	253.78
Steele	42	812	769	68	3,466.08	632.34
Hennepin	30	941	876	75½	4,063.04	430.81
Wright	77	1,849	1,717	135	7,723.40	1,418.71
Meeker	104	2,979	2,769	223½	12,340.94	2,893.01
Dakota	46	942	875	70	3,949.49	557.63
Blue Earth	31	898	845	69½	3,637.41	837.11
Pierce, Wis	8	186	173	11½	786.40	150.30
Dunn, Wis	2	52	49	3½	223.90	58.99
St. Croix	20	142	130	12½	597.47	150.20
Washington	3	85	80	8	361.08	67.82
Morrison	14	317	295	62½	1,334.89	341.78
Pepin, Wis	3	59	55	6	251.78	70.38
Dodge	1	20	18	1½	81.88	19.18
Mower	8	144	137	9	631.80	173.01
Rice	61	1,226	1,159	117½	5,398.72	889.76
Olmsted	5	122	114	8	516.02	136.32
McLeod	101	2,283	2,093	161½	9,442.25	1,412.98
Millelacs	1	21	19	1½	90.82	12.22
Kanabec	1	19	17	1½	79.55	18.72
Douglas	3	56	52	4	235.57	72.52
Brant, S. Dak	8	204	198	18	896.06	271.88
Total	1,406	34,877	32,427	2,673½	144,729.92	22,929.35

Results secured in 1904 by 112 of the most successful farmers growing beets for the Minnesota Sugar Company.

Locality.	Name of grower.	Land in beets.	Gross weight of beets.	Net weight of beets.	Gross proceeds.	Net proceeds.	Yield per acre.	Net proceeds per acre.[a]
		Acres.	*Tons.*	*Tons.*			*Tons.*	
Hamel	Peter Morin	2½	120,200	106,175	$236.64	$214.58	21	$85.83
Buffalo	O. E. Stromberg	2	125,600	....	266.90	267.35	....	133.675
Maplelake	Onesime Hinso	3	123,900	115,500	259.87	229.79	19.2	76.60
South Haven	Carl Muehring	3	115,850	107,730	242.39	205.98	18.8	68.66
Eden Valley	Jos. Moser	2	81,605	75,485	169.84	150.70	18.8	75.35
Do	N. P. Rothstein	1	33,400	31,895	70.64	62.68	15.6	62.68
Do	N. H. Schreifels	1	47,600	45,220	101.74	91.86	22.6	91.86
Do	Chr. Schuetz	1	46,960	43,250	97.31	86.57	21.6	86.57
Do	Math. Thielen	2	101,080	92,720	208.62	190.61	23.1	95.30
Long Lake	Jerry Hannen	1	46,800	43,290	97.40	87.94	21.6	87.94
Mapleplain	C. A. Swonson	1	43,900	41,925	94.33	85.00	20.96	85.00
Dassel	John Almquist	2	83,170	76,520	172.17	146.97	19.1	73.48
Do	P. A. Anderson	1½	77,890	71,660	161.24	139.07	23.8	92.71
Do	Daniel Danielson	4	150,335	135,980	305.83	255.28	16.9	63.80
Do	P. J. Sallberg	1	44,440	40,885	91.99	77.67	20.4	77.67
Do	P. A. Swedelius	1	48,835	40,300	90.67	77.15	20.1	77.15
Darwin	A. Lindquist	1	71,400	66,845	150.40	131.70	33.4	131.70
Maple (P. O., Waconia).	L. Schindele	20	693,650	649,615	1,461.63	1,321.92	16.2	66.09
Mayer	Chas. Haueter	1½	81,600	76,295	171.66	151.41	25.4	100.94
Silver Lake	F. B. Zoik	1	53,500	49,560	111.51	91.43	24.7	91.43
Hutchinson	Wencel Oliva	2	78,225	72,935	164.10	143.52	18.2	71.76
Do	Jos. Zoodlik	1	44,900	42,280	95.13	82.33	21.1	82.33
Norwood	Peter Efferts	4	179,016	167,661	377.23	341.07	20.9	85.26
St. Louis Park	F. Schillinger	2	80,640	75,470	188.68	185.68	18.8	92.84
Waconia	Albert Burandt	2	82,100	78,385	176.37	161.87	19.5	80.93
Do	John Kelzer	1	42,646	38,590	86.83	79.29	19.3	79.29
Do	Henry Schwartz	1	42,122	38,330	86.24	80.83	19.2	80.83
New Ulm	Ernst Fritche	2	89,800	84,920	191.07	168.45	21.2	84.23
Hanska	Knud O. Lee	1	39,600	37,025	83.31	72.93	18.5	72.93
Do	Jacob Synsteby	1½	75,600	70,640	158.91	134.22	23.5	89.48
Nichols	Michael Barry	2	83,006	77,611	174.62	159.45	19.4	79.73
E. Henderson	F. M. Spencer	1	43,520	40,040	90.09	86.32	20	86.32
Chaska	Leonard Ess	30	971,580	906,790	2,040.28	1,886.41	15.2	62.88
Do	Adam A. Schaefer	2	79,145	74,790	168.27	156.37	18.6	78.18

[a] Deductions from gross proceeds are made for freight, cost of seed, and use of machinery.

Results secured in 1904 by 112 of the most successful farmers growing beets for the Minnesota Sugar Company—Continued.

Locality.	Name of grower.	Land in beets.	Gross weight of beets.	Net weight of beets.	Gross proceeds.	Net proceeds.	Yield per acre.	[illegible]
		Acres.	*Tons.*	*Tons.*			*Tons.*	
Helena	John Stocker	3	115,450	109,405	$246.16	$219.26	18.2	[illegible]
Jordan	Peter Stocker	2	91,100	85,125	191.56	170.84	21.3	[illegible]
New Prague	F. J. Bartusek	2	77,380	72,065	162.12	146.75	18	[illegible]
Do	Ignac Fierst	4	186,890	175,775	354.90	322.34	21.97	[illegible]
Do	John Kubes	2	109,550	101,730	228.90	209.29	25.4	[illegible]
Do	Math Kucera	1	43,960	41,025	92.31	84.11	20.5	84.11
Do	Frank J. Lukes	3	127,970	118,295	266.16	243.76	19.57	[illegible]
Do	Frank Minar	2	76,930	71,515	160.92	148.97	17.8	[illegible]
Do	Thomas Novak	1	38,220	35,430	79.73	71.44	17.6	[illegible]
Do	J. Schoenbauer	1	54,840	51,940	117.11	107.07	25.97	[illegible]
Do	John J. Svoboda	1½	68,370	65,565	131.82	119.20	22.8	[illegible]
Do	John W. Tupy	1	53,800	49,120	110.52	103.54	24.5	[illegible]
Do	Thos. Zvanovec	3	140,990	131,140	295.07	265.60	21.8	[illegible]
Suchomels Crossing	John Dvorak	1	42,600	40,340	90.77	82.46	20.2	[illegible]
Do	Peter Dvorak	1½	62,330	57,345	129.02	116.40	19	[illegible]
Do	Joseph Fuerst	3	113,160	106,965	242.15	219.15	17.83	[illegible]
Do	Frank Fried	2	84,600	79,475	180.33	163.91	19.87	[illegible]
Do	Joseph Hajney	1	38,410	36,165	81.23	73.23	18	[illegible]
Do	Frank Hruby	4	146,640	138,290	312.96	282.26	17.2	[illegible]
Do	Jacob Odenthal	2	74,300	69,625	156.66	140.72	17.4	[illegible]
Do	John Studnicka	1	38,220	35,745	80.42	72.46	17.87	[illegible]
Do	Thomas Uhlir	3	132,150	124,610	282.41	262.29	20.6	[illegible]
Montgomery	Carl Augst	10	437,360	407,665	917.25	822.56	20.38	[illegible]
Do	Aug. Bury	5	188,970	177,480	399.15	362.06	17.7	[illegible]
Do	Jerry Carpenter	5	185,615	174,160	411.45	371.00	17.4	[illegible]
Do	Anton Cordes	2	101,940	95,445	214.75	196.11	23.86	[illegible]
Do	T. K. Daleiden	2	143,980	134,615	302.88	276.45	33.65	[illegible]
Do	John J. Deitz	3	115,560	108,680	251.68	227.65	18.1	[illegible]
Do	Herman Ebert	5	325,740	303,720	682.37	624.36	30.37	[illegible]
Do	Wencel Factor	3	156,080	146,925	330.56	301.47	24.72	[illegible]
Do	Albert Flicek	1	48,010	44,770	117.52	99.67	22.38	[illegible]
Do	John Flicek	4	151,290	142,227	320.00	290.39	17.78	[illegible]
Do	John Holy	2	80,580	75,795	170.54	151.63	18.95	[illegible]
Do	Albert Janovsky	3	121,710	114,200	256.95	232.89	19	[illegible]
Do	John Koubele	6	254,700	239,125	538.08	485.40	19.9	114.[illegible]
Do	John H. Koubele	2	88,280	83,195	187.19	170.11	20.77	[illegible]
Do	Albert Krocak	3	125,220	116,880	262.98	237.73	19.46	[illegible]
Do	F. M. Kukacka	2	111,300	103,900	233.91	209.40	25.99	101.70
Do	J. F. Kukacka	5	235,610	219,890	494.75	450.56	21.98	90.11
Do	Jos. R. Kukacka	2	120,650	112,390	252.88	228.90	28.1	114.45
Do	Karl Linberger	6	238,040	224,290	504.65	454.20	18.7	[illegible]
Do	Joseph Louis	2	84,600	80,155	180.35	160.62	20	[illegible]
Do	Agnes Mach	4	202,580	189,340	426.01	385.59	23.7	[illegible]
Do	Leopold Mixa	2	94,080	89,680	202.08	181.59	22.4	[illegible]
Do	Annie Novotny	3	158,010	148,325	347.08	313.38	24.7	104.62
Do	Frank Reher	2	85,910	79,870	179.71	161.07	19.97	[illegible]
Do	John Retka	2	74,600	70,605	158.86	142.64	17.6	71.[illegible]
Do	M. Soulek	2	76,040	71,240	160.29	145.52	17.8	72.[illegible]
Do	Mat. Sklenacek	2	85,290	80,005	180.08	171.44	20	85.73
Do	M. F. Starek	3	118,440	111,210	250.22	228.57	18.5	76.[illegible]
Do	Frank J. Stanko	2	96,050	91,120	205.13	185.27	22.8	92.[illegible]
Do	Frank Troka	3	118,580	111,375	250.60	225.93	18.6	75.[illegible]
Do	John Tupy	1	43,850	41,020	92.30	83.09	20.5	83.09
Do	John Vlasak	6	241,110	229,150	515.65	466.31	19	77.71
Mulfords	John Filipek	2	101,180	95,080	213.92	194.56	23.8	97.28
Do	A. Horazdovsky	3	145,690	134,895	311.10	282.55	22.5	94.18
Do	Jas. Kopet	2	73,000	69,350	156.04	140.01	17	70.00
Do	John Sladek	3	122,700	114,170	256.85	233.85	19	77.93
Do	Frank Watzek	1½	58,790	55,470	124.81	112.42	18.5	74.[illegible]
Kilkenny	Jos. Stangler	2	75,810	71,320	160.47	140.29	17.8	70.[illegible]
Mendota	Joseph Labbie	3	114,905	105,560	237.73	219.02	17.6	73.00
Do	Ruben Lamay	2	91,380	84,395	189.89	175.64	21.1	87.82
Do	F. W. Trapp	1	37,730	34,935	78.58	72.76	17.5	72.76
Do	Jno. Wagenknecht	2	97,240	90,080	202.67	188.38	22.5	94.19
Elko	John Wagner	1	37,620	34,300	78.88	70.15	17.4	70.15
Lonsdale	Martin Coplecha	1½	52,990	49,985	121.06	107.48	16	71.65
Do	Joseph Kalina	2	99,060	94,145	211.83	186.50	23.5	93.25
Do	Thos. Pumper	1	46,800	44,495	100.11	88.47	22.24	88.47
Le Sueur Center	August Ehmke	1	56,195	52,050	117.11	104.00	26	104.00
Do	Conrad Lang	1½	43,905	41,085	92.25	82.83	13.6	55.31
Do	Julius Marcude	1	40,080	38,250	86.06	75.40	19	75.40
Do	Frank Picha	1	37,900	35,860	80.68	70.60	17.9	70.60
Do	F. Preuss	1	49,340	46,000	103.70	91.61	23	91.61
Do	Wm. Tiede	1½	62,015	58,130	130.79	114.80	19.4	76.59
Do	Aug. Traxler	1	45,960	43,675	98.27	86.70	21.8	86.70
Do	Sig. Traxler	2	95,515	89,640	201.69	178.32	22.4	89.16
Hastings	Chas. Freitag	2	75,800	71,280	160.31	144.65	17.8	72.34
Maiden Rock, Wis	E. J. Sjostrom	1½	[illegible]	[illegible]	126.11	109.24	18.7	72.83

NEBRASKA.

There is to be noted a general improvement of conditions and results throughout Nebraska. These are influenced principally by the employment of the irrigated lands in the western part of the State for beet growing. Each of the factories secures nearly as many beets from the irrigated districts of the west as in its immediate vicinity.

The American Beet Sugar Company is removing its factory from Norfolk to Lamar, Colo.

The following is a summary of the average results for these factories during the year:

The average acreage of the factories was 4,366 acres.
The average yield per acre was 9.41 tons of beets.
The factories worked an average of 41,100 tons of beets.
They produced in sugar an average of 9,791,333 pounds, or 4,895.6 short tons.
The sugar in beets averaged 15.06 per cent; the purity 81.48.
The sugar factories paid the farmers for beets approximately $616,500.

GRAND ISLAND.—During the past two years this factory has been much more successful than in previous years. This is largely due to the opening up of the western part of Nebraska to beet growing, its location being much nearer than the rest.

The factory is paying a higher rate than formerly. It now pays a flat rate of $4.50 per ton. The high grade of beets grown in the western part of the State, which contributes the greater part of the supply, will sustain this price. It pays 25 cents extra for handling and 20 cents additional for beets that have been siloed awaiting a call from the factory.

Beet growing in its own vicinity, as well as in the western district, was very satisfactory and encouraging, both in tonnage and quality of the beets. Beet growers near the factory probably secured the best yield for several years.

LEAVITT.—This factory (near Ames) had a larger area contracted and planted to beets this season than ever before. A large part of its beets also are now grown in the western part of Nebraska. The management for a number of years has secured the control of considerable territory in that section, especially lands under irrigation from the Culbertson ditch.

The principal obstacle to growing beets in the western part of the State has been the lack of help on the farms. Gradually this situation is improving.

During the season this company conducted experiments with commercial fertilizers in cooperation with the Department of Agriculture under the direction of Doctor Townsend of the Department.

Frequent rains in June gave the weeds considerable start, causing difficult cultivation. This was true not only of the beet fields near the factory, but also of the fields in the western part of the State where irrigation is employed. Beets grown in this part of the State this year were matured almost entirely without irrigation.

Beets grown near the factory in the eastern part of the State were up to the standard, compared with those of any other year since the factory has been in existence. Sufficient rain fell to produce a crop, after which followed a dry spell, elaborating the sugar in the beets and producing high quality.

Throughout the campaign of this year the beets averaged over 15 per cent sugar.

The management of this factory announces that it will pay a flat rate of $5 per ton for beets next year. At the rate contracts are coming in, 8,000 acres are anticipated for the next campaign.

I submit a report made by Mr. H. Scilley, the agriculturist of the Standard Beet Sugar Company, at Leavitt. Mr. Scilley is one of the most careful and progressive beet growers in the country. His report is as follows:

LEAVITT, NEBR., *December 20, 1904.*

DEAR SIR: The Standard Beet Sugar Company is located at Leavitt (near Ames), Dodge County, Nebr. The length of the campaign this year will be about one hundred and sixteen days.

The past season has been, on the whole, favorable to beet growing. It was very dry in the spring in the irrigated districts in the western part of the State. A large acreage was grown for this factory, and a large portion of the land had to be irrigated before it was plowed. When the rains did start they were continuous for some time, so that the crop was rather late in a good many places. We succeeded, however, in getting a fairly good stand, which was considerably damaged in sections by heavy hail storms later in the season.

The beet crop is growing in favor with the farmers in our territory, especially in the western part of it, as the price now paid for beets enables the farmer to make a good profit on a moderate tonnage. In the eastern part of the State it is also growing in favor from the same cause, but the size of the farms in the eastern part of our territory operates against the industry, as a farm of 160 to 240 acres can be farmed to corn or grain with a small amount of help, and the average farmer does not care to handle a crop requiring a large amount of help.

The principal developments this year favorable to beet growing have been the better handling of water in the irrigated territory and the cultivation of the crop as soon after watering as possible. This we have tried to have done, and it has greatly increased the yield.

In our eastern territory we have found that land subject to leaf spot if planted late will be very slightly affected, as by the time the plants get large enough to catch the infection the nights have become cool, rendering the conditions unfavorable for the development of diseases of this kind.

Several experiments have been conducted with artificial fertilizers by our beet growers this season, but without any apparent results, whereas the application of well-rotted barnyard manure has again given a greatly increased yield and has pretty conclusively proven itself to be away ahead of any commercial fertilizer. The different varieties of beet seeds we experimented with this year have all proved very satisfactory, especially that grown by Mr. E. H. Morrison, Fairfield, Wash.

A new beet-topping machine, brought out a year ago, was tried and does excellent work, pulling, topping, and putting the beets in windrows at right angles to the direction in which the rows run, the same as a hayrake leaves hay. No other new labor-saving implements have been tried this year.

We had contracts with 400 farmers this year. We harvested 5,900 acres.

We paid $4.50 and $5 per ton for beets this season, and are making our new contracts at $5 on track.

The prospects are very good for 1905, and we are looking for an increased acreage.

The seeds we used this season are as follows: Original Kleinwanzlebener, 40 per cent; Aderstedt, 20 per cent; Dippe Kleinwanzlebener, 20 per cent; Braune's Elite, 5 per cent; Schreiber's, 6 per cent; Knaur's Mangold, 6 per cent; Naarden, 1 per cent, and Morrison, 2 per cent.

The lands giving us the best results are the rather heavy sandy loam soils that are free from surface water and yet not too far from moisture. The tableland in the western part of the State, where the soil is a sort of a magnesia clay, also gives us excellent results when properly watered.

The beet crop is rapidly becoming more permanent, as we are getting now a line of growers that make a practice of growing a fixed acreage each year, preparing their land one year ahead, and they are having such good results that it is encouraging their neighbors to try it also. It is only a question of a few years when the manufacturers of sugar will be justified in putting up additional factories in Nebraska. The quality of the beets for the last two campaigns has been as good as at any point in the Western States, California possibly excepted.

Yours, very truly,

H. SCILLEY,
Agriculturist of the Standard Beet Sugar Company.

The beet-growing interest of the Standard Beet Sugar Company in the western part of Nebraska is under the superintendency of Mr. James Scilley, who is also a practical beet grower.

Desiring to follow in detail the progress of sugar-beet growing in the western part of Nebraska, I requested Mr. Scilley to make a report on this work, which is as follows:

NORTH PLATTE, NEBR., *December 26, 1904.*

DEAR SIR: Yours of the 21st received. I am glad to inform you that the sugar-beet acreage in western Nebraska was considerably increased this year, and that the results have, as a whole, been very satisfactory to the growers as well as to the factory. The Standard Beet Sugar Company had about 2,500 acres in the North Platte Valley and the American Beet Sugar Company about the same amount, making a total of 5,000 acres in all.

Quite a number of farmers employed Russian help, putting in all the way from 30 to 125 acres; for instance, Dolan & Clarke, of Vromin, put in 120 acres, getting Russians to do the hand work. The beets netted around 15 tons to the acre at $5 per ton, which gave the growers a very handsome profit. These beets were delivered to the American Beet Sugar Company, Grand Island.

At Maxwell, Nebr., Ed. Hostetter had 5 acres, and made a little over 20 tons to the acre; Harry Pell had 3 acres which made 25 tons, and 2 acres, 18 tons per acre; Carny Hutchinson had 5 acres which made about 16 tons to the acre; E. E. Hardisty had 10 acres which made 16 tons to the acre; John Shaver, 20 acres with about 18 tons per acre; Scott Shaner, 9 acres with 15 tons per acre; August Larson, 5 acres with 15 tons per acre. All of these, with many others, were delivered to the Standard Beet Sugar Company, and the growers received $5 per ton on track at Maxwell.

At Brady Island E. W. Murphy had some 5 acres which made 18 tons to the acre; Joseph McGee, 15 acres which made 17 tons to the acre, and many others raised from 12 to 15 tons per acre.

At North Platte we unfortunately had a very severe hailstorm, which destroyed all other crops and reduced the tonnage on the beet crop so that we got in this district from 8 to 12 tons to the acre. The North Platte Sugar Beet Company had 127 acres that made somewhere in the neighborhood of 8 tons per acre. This low tonnage was caused partly by the hail and partly by the irrigation ditches going dry, so that when the foliage was destroyed the ground dried out very rapidly and beets did not get started again until several weeks later, when we had rains enough to supply moisture.

Growers having a large acreage could not get over the ground fast enough with cultivators to conserve moisture. William Longrath, in the same territory, raised about 12 tons to the acre on 28 acres. Mr. Longrath got into his field immediately after the hail and stirred the soil, giving his beets a chance to recuperate.

Let me say here that, in my opinion, where beets are of good size and are stripped of their entire foliage by hail, if farmers, instead of getting discouraged, will go ahead and cultivate properly they need suffer very little from the effects of the hail. (See Pls. I and II.) While the hailstorm reduced the yield in this territory, it will be the means of very largely increasing the acreage in 1905, as a good many farmers lost all their other crops, but where they had sugar beets their beets made a fair showing.

Mr. L. F. Waugh, of North Platte, had 10 acres of beets that he did not get planted until about the 25th of June. All his other crops were entirely destroyed by the hailstorm, but his beets made 8 tons per acre; as he did the work with his own family, it made him a nice little bit of money. A. T. Warnack had a little over tons per acre on 30 acres in the same territory. Joseph McConnell, on a 5-acre tract at Hershey, raised 20 tons to the acre. This particular piece of ground had never raised a crop before on account of the cold alkali nature of the soil.

George Mudd, of Hershey, had 80 acres that yielded from 10 to 18 tons per acre, the hand work being done by Russian help. He cleared something like $3,000 on his crop. These beets were delivered to the American Beet Sugar Company. Louie Tollier, of Hershey, grew 20 acres for the Standard Beet Sugar Company, on which he cleared $41 per acre.

Alexander Nielson had 10 acres in for the Standard Beet Sugar Company, which yielded 15 tons to the acre. W. H. Graham, of Sutherland, got 18 tons to the acre from part of his 25 acres. David Hunter, of Sutherland, got an average of 18 tons to the acre from 45 acres. H. H. Hartman got 18 tons to the acre from 5 acres at Paxton.

I can not take time to give you the names of all the growers, so I have just given you samples from the different places. I will say that two-thirds of the growers in this territory raised from 12 to 25 tons to the acre; the balance from 4 to 12 tons.

Both the American and the Standard companies paid a flat rate of $5 per ton; and they weighed and tared the beets at the different loading stations, which gave much better satisfaction than paying on the sugar basis. The beets averaged about 16 per cent sugar.

I am glad to inform you that we have been able to get much better work done than last year, and that there is much enthusiasm in the sugar-beet growing among farmers. Where a good crop was not secured farmers can see and understand why, and, instead of getting disgusted with the crop and saying it is a "fake," they admit their mistake and are going to plant again and profit by their experience. For instance, some men imagined when they got Russians or others to do the hand work that the less they did themselves the farther ahead they would be. Consequently they would only plow about 3 inches deep, not half prepare the ground before planting, and cultivate as little as possible after beets came up. The result was that if they got enough to pay their help they did well.

After this year's experience, I wish to impress beet growers with the necessity of first plowing deep, then pulverizing the soil, then packing with a roller or some other machine in order to get soil so it will hold moisture, and also to get an even stand of good healthy beets. It also enables cultivation as soon as beets are up (which can not be done without injury to the crop in loose ground), thus getting rid of weeds before they get a start. Then they should cultivate after each rain just as soon as the soil will permit. They should not be afraid to cultivate a little late if crop requires it, even if they do break a few leaves.

In this territory rows 18 inches apart, and beets 10 inches in the row, will, I believe, give best results. Some hurt their crop by having the beets too close, and others by leaving them too far apart. Three important things are, getting the land ready first, thinning out before the plants get too big, and cultivating properly. I believe growers, as a rule, do not attach enough importance to cultivation, especially where they employ hand labor; but I have known cultivation, other things being equal, to make a difference of 5 tons per acre in the crop this year. As regards the time of thinning, some farmers think just so they get the beets thinned it does not matter when; but the fact is, in the same field, under the same conditions, and planted at the same time, if one plot is thinned out when the plants have four or six leaves, and kept clean and well cultivated afterwards, while another plot is let go until the beets and weeds have almost closed the rows—which will not take long—and is then cleaned out and given good cultivation afterwards, the first plot will make nearly twice the tonnage and have a better sugar content.

My plan this year is to try to get those farmers to take hold that intend to get all there is in the crop; consequently, I am going to try to impress growers with the fact that there is more money in getting 20 tons per acre from 10 acres properly cared for, with ground selected and got ready the year before, than there is in 40 acres at 10 tons per acre done in a haphazard way.

The sugar-beet growing is in a very healthy condition in this valley, and I believe with the same success the coming year this valley will justify a 500-ton factory. The Republican Valley has grown about the same acreage as this, but I am unable to give you the results.

Very truly, yours,

JAMES SCULLEY.

NORFOLK.—This factory experienced a normally successful year. It received a large supply of beets, and those were of good quality. There was considerable wet weather during the early stages of the crop—a great many other crops being drowned out entirely—but the principal damage to beets was the growth of weeds and grass. The stand of beets was very good. The crops yielded a fair average tonnage.

In general, it may be said the results were about as satisfactory this year as in any other of its fourteen years of experience.

NEW YORK.

LYONS.—New York has at present one factory, located at Lyons. It had the most successful year in its history. It had a campaign of one hundred days and over. The beets raised throughout the district averaged 9.38 tons to the acre. The sugar contents of the beets averaged 16 per cent; the purity, 85.

It is interesting to note the general improvement of conditions affecting this factory. It has had to overcome many things, but it appears to be now thoroughly established.

Under the reorganization and the new management this factory has become much more effective during the past season. It had considerably more contracts and a larger area planted to beets than ever before, approximately 5,500 acres.

Owing to snows and inclement weather farmers were late in their planting, very little of which was done earlier than May 1. The weather was unusually favorable throughout the growing season, and results were much more satisfactory than heretofore. The factory received the largest supply of beets in its history.

Binghamton.—The factory formerly operated at this place finally succumbed on account of repeated failures to secure a sufficient supply of beets. It has been moved to Blackfoot, Idaho.

OHIO.

General improvement of conditions is quite noticeable throughout the State of Ohio.

Fremont.—For several years this factory struggled along, unable to secure a competent supply of beets. The factory has now developed sufficient area to insure a larger supply. This season was the most successful of its history. It worked a campaign of one hundred days or over. The farmers secured an average of 9 tons of beets per acre. The average sugar contents of the beets during the campaign was 16 per cent; the purity, 84.

Conditions have been gradually improving at this place. The company has succeeded in making more contracts than in past years. Farmers previously growing beets, as a rule, increased their acreage. It contracted for approximately 5,000 acres of beets. Not all of this was planted; over 4,000 were harvested.

The company arranged for the colonization of Russian families to do the work in the beet fields.

December 19 the company entertained several hundred beet growers. There were marked indications of better feeling and understanding between the company and its beet producers than in former years. This concern seems to have finally reached a condition of stability insuring its permanent progress.

OREGON.

The sugar industry in the State of Oregon shared in the general prosperity of the industry. This season's results are the best since the establishment of the one factory, this result being largely due to the better methods of the farmers in beet growing.

The general average yield of beets per acre in Oregon was 8.4 tons; sugar in the beets, 15.3 per cent; purity, 85.5.

La Grande.—Factory conditions are gradually improving at this place. Last season (1903) it had in about 1,800 acres of beets; this season it secured approximately 3,000 acres. New sections are opening up to this production, and they exhibit more interest in the crop than those in the immediate vicinity of the factory.

The extra work in the beet fields was accomplished by importations of a large number of Japanese and Indians. The Indians were secured from the Umatilla Reservation and the Japs from Portland and towns along the western coast.

The factory ran sixty-five days, a much longer campaign than at any previous time in its history.

The sugar-beet culture is finding more favor with the farmers generally, but not to the extent it should. There are many reasons for this. One is that the country is exceptionally rich and produces ordinary crops with little attention, particularly small grain.

Here deep fall plowing is conducive to large tonnage of sugar beets. The frost improves the land, affording an excellent bed for seeding. On fall plowing, however, beets will generally be much shorter than on spring-plowed ground.

The best fertilizer is alfalfa, but as it requires two years to secure a good stand, this crop, for best results, should continue on the land that long. The agriculturist recommends for green manure planting wheat or oats quite thick, allowing them to grow from 2 to 3 feet high, and then disking them under. By hanging a heavy chain in front of the disk plow, every particle of green grain will be well covered, and the crop of beets next season will be much benefited.

The factory harvested about 2,500 acres this year. The tonnage was very good. It pays $4.50 per ton for beets at the factory. The prospects for 1905 indicate a largely increased acreage. It uses the Kleinwanzlebener seed mostly, but has made trials of some seed grown locally with excellent results. The soil is sandy and black loam. The sandy land is more easily worked, but the black loam brings the heaviest yield. Taking all in all, however, the sandy loam is preferred, for the reason that less dirt sticks to the beets; it can also be worked in wet weather, while the black loam becomes sticky and beet tools fail to scour.

UTAH.

This State now has four factories, located at Logan, Ogden, Lehi, and Garland. The first three have been operating for several years. It may be said that all have fully worked out and developed conditions insuring successful future operations. The three older factories had long campaigns, ranging from one hundred to one hundred and fifty days.

Arrangements have been made for establishing two other factories in this State, to be in operation next year.

The average results of these factories for the season are as follows:

The average acreage of the factories was 5,012.5 acres.
The average yield per acre was 12.12 tons of beets.
The factories worked an average of 60,750 tons of beets.
They produced in sugar an average of 14,180,150 pounds, or 7,090 short tons.
The sugar in beets averaged 14.77 per cent; the purity, 82.96.
The factories paid the farmers for beets approximately $1,215,000.

GARLAND.—This is the second year's operation of this factory. Its supply of beets was considerably greater than that of last year, and the general results were satisfactory to all. The town of Garland has been very much stimulated in a business way.

Outside the usual help on the farms, extra labor was supplied by a large colony of Japanese imported into the section, and an equal number of boys from Salt Lake City and the larger towns.

Many Japanese are hired in the Garland district. A number of these have rented about 500 acres of land for beet growing.

The Bear River Valley is one of the best in the United States for sugar-beet raising. It has a perfect irrigation system and excellent climatic conditions.

On account of the superior agricultural character of this district, the Utah Sugar Company is now producing there most of its beet seed, approximately 20,000 tons this year. The company has stored away about 150 tons of mothers at Garland, and 50 tons at Lehi, to be planted for seed production next year.

LEHI.—The season opened up quite favorable in this vicinity. A full supply of beets was early contracted, enabling the lands to be put in the proper condition at the proper time. The factory has fully and completely established itself.

During the season the slicing plant located at Bingham Junction was removed, to facilitate the beet-growing in the district known as Spanish Fork and other near-by localities. It appeared that this change would better meet the needs of the factory and accommodate more farmers producing beets. The location at Bingham Junction was too near Salt Lake City; the land could be utilized for other intensive purposes, particularly supplying products for the city market.

For eight years the company has been engaged in the production of home-grown seed. This seed ranks very high in quality in comparison with the seed imported from Europe, showing, as a rule, higher vitality and producing beets of a better quality. The plant has cooperated with the Department of Agriculture in the experiments to produce a race of beets bearing seeds each containing a single germ.

The results in beet growing were more favorable than in any other year in the history of the plant.

Mr. Thomas R. Cutler, general manager of the Utah Sugar Company, which owns two factories in Utah and two in Idaho, as to the conditions prevailing this year, makes the following report:

SALT LAKE CITY, *January 14, 1905.*

DEAR SIR: Our two factories belonging to the Utah Sugar Company are located at Garland and Lehi, Utah. The former factory was in operation fifty-nine days and the latter one hundred and one days.

The climatic conditions in Utah have been very favorable for beet culture.

Utah has been particularly happy in the fact that its farms are held in very small acreages, the average contract, perhaps, not being 7 acres to the farmer, and the farmers, having their own labor, are entirely independent.

The beet crop is more remunerative than any other product, and as the water for irrigation is becoming more expensive each year, the farmers find that it is necessary to utilize the water on such crops as will yield the largest revenue. At Garland the farmers are demonstrating from time to time that, on such lands as are suitable for raising beets, this crop brings them in more than grain or alfalfa, which have been the main crops during the past.

Experience has taught the farmers, both in Utah and Idaho, that it is very essential to select the choicest land for the beet crop, also [illegible]d that can be uniformly irrigated, and to get the best results this crop must be [illegible]d after very carefully.

We have tried in Utah and Idaho almost all kin[illegible] artificial fertilizers without any apparent beneficial results; but we have discov[illegible] that barnyard manure or green alfalfa, plowed under, is very good. This gives the farmer good tonnage and does not impair the quality of the beets. We have demonstrated also in Utah that beet seed can be successfully raised on such lands. In Idaho as yet no beet seed has been grown.

The four-row beet-seed drill is far superior to what it was ten years ago. Also what is known as the two-row and four-row horse cultivator is a great labor-saving implement, and the new beet lifter or digger that has been largely introduced is a great improvement over the old-style beet plow.

We understand that some implements for topping and digging the beets have been used in some localities, but without any satisfactory results.

The number of contracting farmers at Garland was 250; at Lehi, 1,800. The number of acres harvested at Garland was 2,857; at Lehi, 9,200.

At Lehi and Garland the price for beets delivered in sheds is $4.75 per ton. Where they come in by car, the price varies from $4.25 to $4.50.

At Garland the acreage has been materially increased. At Lehi, at this date, the prospect is just as good as it was last season.

At all our places we have planted 75 per cent of the Original Kleinwanzlebener seed; the other 25 per cent is of Gebr. Dippe seed, with just enough of other kinds for experiments.

A sandy loam with clay subsoil is the best adapted in our localities. In many cases clay loam produces just as large a tonnage with satisfactory results as to sugar and purity, but the latter is not as easily prepared to receive the beet seed as the sandy loam, unless properly plowed in the fall.

The Lehi factory had a slicing station, as you know, at Bingham Junction, but last spring this station was removed to Spanish Fork, 27 miles south of the main plant at Lehi. The reasons for making this change was that we could not get sufficient water the latter part of the season for the operating of the plant at Bingham Junction; and again there were not enough beets delivered at that point by team to justify retaining this plant there; so it was moved, as stated above. At the new location we get about 3,000 acres of beets delivered by team.

Yours, very truly,

THOMAS R. CUTLER,
General Manager.

Ogden.—The factory at this place has been very much improved by the installation of the Osmose process and by other recent improvements. It secured a larger acreage than usual, farmers generally increasing their amount of land devoted to beets.

The early season was quite favorable. There was plenty of water in the ground and a large deposit of snow upon the mountains upon which sufficient water for irrigation depends.

The spring was a little too cold and wet, but this was followed by better weather and generally good results in beet production. Prospects for the future are very encouraging.

Logan.—Weather conditions were unfavorable during the spring months in the farming districts supplying this factory with beets. Following the inclemency of the early season came insects doing damage to such an extent in places that farmers plowed up their beets, on the whole, considerably decreasing the area supplying the factory. As the season progressed it was much more favorable. The yield was considerably better than anticipated; especially the quality of the beets was higher than usual.

Though this factory has operated four years, it has never secured a supply of beets giving anything like a long campaign. Everything considered, this has been the most successful run in the history of the factory.

WASHINGTON.

General conditions throughout the beet-growing district of this State during the past season were not as favorable as those noted in most other beet-growing districts. The rainfall was slight. While the acreage secured by the factory was quite sufficient, the average yield was low. Comparing results in the beet fields with other crops, however, the situation seems much more encouraging, as cropping in the State was unfavorable generally during the season. Increased satisfaction seems to prevail among the farmers generally. Prospects appear fairly good for next season.

Waverly.—Conditions around this factory are gradually improving. Farmers are becoming more accustomed to beet culture and better advised as to its crop returns, one year compared with another.

This season was exceedingly dry, having less than half the usual precipitation from April 15 to November 1. The yield per acre was about 66 per cent of that of former seasons. No beets are grown under irrigation for the factory.

The beet crop is gradually growing in favor with farmers, because of better remuneration, as a rule, than that realized from other crops.

Barnyard manure is the principal fertilizer for beets, giving very satisfactory results. Its use increases with each successive season.

The factory pays for beets $5.25 per ton delivered in company's sheds at Waverly. Present indications are favorable for an increase over last year's acreage.

The seed mostly used is original Kleinwanzlebener.

The soil is mostly black loam, on a yellow clay subsoil, with rolling surface. There is but little flat or level land in the beet-growing district. About 90 per cent of the cultivated area is rolling. The flat or level lands are too cold for sugar beets.

WISCONSIN.

Two sugar factories have been established in the State during the year. The machinery for the factory at Janesville was moved from Dresden, Canada, and that for the one at Chippewa Falls from Kalamazoo, Mich. For new concerns the results were very satisfactory, both to the farmer and the factory. The latter is under the management of the same parties who operate the factory at Menomonee Falls.

There has been more agitation in this State for the establishment of new factories than in any other section of the country. The factories in this State will be doubled in the near future. General conditions were quite favorable to beet growing.

A summary of average results for the year in Wisconsin is as follows:

The average acreage of the factories was 3,166 acres.
The average yield per acre was 11.37 tons of beets.
The factories worked an average of 36,000 tons of beets.
They produced in sugar an average of 7,866,666 pounds or 3,933 short tons.
The sugar in beets averaged 14.54 per cent; the purity, 83.51.
The sugar factories paid the farmers for beets, approximately, $540,000.

Chippewa Falls.—The season started in this locality with quite favorable indications. Before its installment the plant had placed contracts with the farmers for a full supply of beets for operating its first campaign. For a first planting the stand was good, and, generally speaking, the quality and yield of beets was very satisfactory.

The plant was shipped here from Kalamazoo, Mich., and reinstalled at this place. It was improved and enlarged, and with it was installed a pulp-drying plant. It is the purpose to produce a stock food from the by-products—pulp and molasses—similar to that produced at Janesville, Wis., and at Alma, Mich.

As to conditions and results this year, I publish below a report made by the agricultural manager, A. F. Postel, as follows:

Chippewa Falls, Wis., *January 12, 1905.*

Dear Sir: Complying with your request of December 16, permit me to hand you the following information herewith:

The name of the company is the Chippewa Sugar Company. It was built in 1904.

The past season was wet and cold, and therefore not propitious for getting the best results in beet culture. Still, in spite of this, the results obtained were very satisfactory, taking into consideration that this is our first season. Potatoes rotted in the ground and corn did not become thoroughly ripe, so that crops were half failures.

Adding to this the prevailing low price for potatoes, it can be easily seen that the hardy and ever-sure beet crop with its fixed price is finding favor with the farmers. They have already prepared a larger acreage for beets in the fall.

We applied extensive subsoiling in the fall of land to be devoted to beet culture this season. Experiments with fertilizers have not been made, as this was our first season and the farmers were not inclined to go to any extra expense beyond what was absolutely necessary. Still we shall encourage such experiments the coming season again and hope to accomplish something along this line.

Four different kinds of seed were tried: Elite Kleinwanzlebener, C. Braune, Biendorf; Imperial Kleinwanzlebener, O. Hoerning, Volkstedt; Original Kleinwanzlebener, Rabbethge & Giesecke; American-grown, E. H. Morrison, Fairfield, Wash. The results obtained were overwhelmingly in favor of the Braune seed as regards tonnage and sugar percentage, so that this seed will be used almost exclusively the coming season.

The implements of recent design used by us were the following: Two-row beet and corn-drill combined; two-row beet cultivator; one-row beet lifter and subsoiler combined. These tools have given good results and can be recommended. The drill will plant either beet seed or corn, and has the further advantage that it will plant the necessary amount of seed per acre (18 pounds of seed in rows 20 inches apart); so that the farmer can not use less seed even if he wants to, unless he plants in rows 22 or 24 inches apart, in which case the stand in the row will be the same; i. e., a full one.

The number of beet growers who signed contracts was 1,600. The number of acres harvested was 3,000. We paid $4 per ton for beets containing 12 per cent or less of sugar, and 25 cents more for each per cent above this. The average price paid this year was $4.75 per ton, and 25 cents additional for beets delivered after November 1.

Clay loam and sandy loam are the best beet soils.

The farmers around here seem willing to learn, which can not always be said of the farmers in other localities. This is demonstrated by the fact that the majority of our beet growers this year not only manured, but also subsoiled, intended beet land in the fall. I regard subsoiling as absolutely essential to success in beet culture on the heavier soils, and for this reason I gave the growers around here a beet lifter which they could also use as a subsoiler. In this way I "killed two birds with one stone," and hope to see the spangle-rooted beet disappear entirely and have it replaced by the normally-grown beet with one long and smooth root, pleasing to the eye and the pocketbook of the beet grower and sugar manufacturer alike.

JANESVILLE.—The early season in this district was quite favorable to beet growing. The people are engaged in tobacco culture to a considerable extent. Some of the acreage hitherto devoted to this product was put in sugar beets for the first time this year. Altogether about 4,000 acres were contracted for the factory, some of this being in northern Illinois.

To considerable extent beets have been grown at this place for the factory at Menomonee Falls for the past three or four years. As the farmers were accustomed to tobacco production there has been considerable speculation as to the reception the tobacco growers would give the beet crop. The Milwaukee News, in discussing this point, gives the following figures:

> The number of acres of beets planted in the county last year (1903) were 654; in tobacco during this period there were 7,372 acres. This year (1904) 3,280 acres were planted to beets, and only 4,900 to tobacco.

The season was quite favorable throughout; results of beet growing were quite generally satisfactory.

In addition to manufacturing sugar the factory has installed a pulp-drying plant. The wet pulp and waste molasses are mixed together and dried in this plant for stock food. This is an innovation in Wisconsin, but undoubtedly on account of the heavy stock interests of the State the stock food will find a ready market. For storing this product the plant has installed a large warehouse devoted exclusively to its use. The plant has done very satisfactory work taking care of the refuse pulp as it came to it from the factory.

This company adopted the innovation introduced at Menominee, Mich., last year. Invitations were sent out to 3,500 farmers to attend a barbecue to be held at the factory. A programme was arranged, including speeches by some of the leading business men and agriculturists of the State. This method brings the farmers in closer touch and is more effective in demonstrating their interests in the beet-sugar industry.

Last spring was cold, wet, and late, and there was six weeks' drought in July and August. There was excellent harvesting weather in the fall. The season as a whole was not a bad one for beets. Early in the spring plenty of rain fell, which gave good germination. Also late in the fall, September and the early part of October, there were very beneficial rains, which helped materially in enlarging the yield.

Beet growing is in favor with the farmers, although they do not go into it on a large scale, the average being about 2½ acres to each farm.

There were 1,350 contracting farmers, who harvested 3,250 acres.

The prices paid for beets and the contract conditions are as follows:

> The company agrees to pay for all suitable beets delivered under the contract $4.50 per ton (net weight) for beets averaging 14 per cent or less of sugar, and at the rate of 25 cents per ton for each additional 1 per cent of sugar contained in the beets.
>
> The company agrees to pay an additional amount of 25 cents per ton for all beets delivered to its factory by wagon. In addition to the above the company agrees to pay 25 cents per ton for all beets delivered after November 1. Payments are to be made on the 15th of each month for beets delivered during the previous month.
>
> All testing of beets shall be done in the laboratory of the company by a chemist appointed by Prof. W. A. Henry, director of the agricultural experiment station at Madison.
>
> In the event of the factory of the company being destroyed by fire, or for any other reason incapacitated at any time previous to the delivery of the beet crop, the company shall have the option to pay the beet grower $5 per acre for all beets he may have under proper cultivation, allowing the grower to retain the crop.
>
> The company guarantees a freight charge of 25 cents per ton in car lots of 15 tons minimum weight from all points within 50 miles of Janesville, Wis.
>
> All car shipments shall be weighed by the Western Railway Weighing Association and settlement must be made on the basis of such weights.

There were approximately 36,000 tons of beets harvested.

The prospects for acreage for 1905 are very good. The factory anticipates contracts for at least 5,000 acres.

The seed used this season was the Hoerning variety.

The best results this year came from old tobacco ground. The soil conditions differ in the different localities. The principal soils are black sandy loam, a heavy black soil, a clay loam, and a clay mixed with black dirt and sand, with generally a good clay subsoil. The best results come from the sandy loam soil.

This part of Wisconsin is developing very rapidly in the beet-growing industry, and is certainly giving good results. The farmers have become more educated in the matter, and will naturally show more interest next year than this.

MENOMONEE FALLS.—It is estimated that fully 4,000 acres of beets were planted for this factory.

To the energy and intelligent systematic work of Mr. R. G. Wagner, manager of the factory at Menomonee Falls, is largely due the rise and healthful progress of the beet-sugar industry in that State. As to conditions and results in the factory districts he makes the following report:

MILWAUKEE, WIS., *January 7, 1905.*

DEAR SIR: I consider the past season as not the very best for sugar beets. The early summer months were very cold, while the month of September and the first half of October were cloudy and rainy. However, while this undoubtedly kept down the sugar content, which is averaging so far about 14.75 per cent, the tonnage is very good. Many farmers who have grown beets for us now for four years obtained 18 tons and more to the acre.

To get at the correct average of beets per acre is not practicable, owing to the fact that I do not know how many acres were planted or harvested. I have found that farmers are not very careful about planting the same acreage as contracted for. In fact, the farmer does not measure off his field—simply guesses at the contents; and I have frequently found that where a farmer has contracted for 5 acres and thinks he has 5 acres, he has not really 4; while, on the other hand, farmers who contract for 1 acre frequently plant 1½ acres. Based on the acreage contracted for, I believe our average tonnage to be about 12 tons.

The farmers in the vicinity of our factory are very much more favorably inclined toward beets than formerly, and have become satisfied that it is not only a profitable crop, but that it is a sure crop. Two years ago, when the potatoes rotted, owing to excessive moisture, beets on the same fields gave good results. We have spent much time and money to educate the farmers to take up beet culture, and we are pleased to state that our efforts have been successful, and we do not anticipate any more difficulty in securing a sufficient supply of beets.

In regard to fertiliser, we have made no experiments with them, except that we recommend barnyard manure to be applied in the fall.

The only labor-saving device that has been tried, and which I think is an improvement on the old method, is that of topping the beets before pulling them, by using a blade attached to a handle, similar to a hoe not bent. This seems to require less labor than the old method of throwing them in piles with the tops and then picking up each beet and cutting it with a knife. No new labor-saving implements have been tried in this district with any success.

We have about 1,800 contracting farmers, who, as near as we know, have harvested about 4,500 acres. We pay $4.75 for beets containing 14 per cent of sugar or less, and 25 cents for each additional per cent of sugar.

The prospects for 1905 are very good.

We have used altogether German seed, particularly Hoerning and Braune.

Our land is mostly clay loam. However, we have also had good results from sandy loam.

At the Chippewa Sugar Company's factory at Chippewa Falls, Wis., which is under my management, the results in securing beets were not very good this year. The reason for this is that it was their first year, and there was practically no fall preparation made for the crop.

It is my intention to thoroughly canvass that territory and to keep experienced agriculturists among the farmers all summer, and from known results where the beets had proper care I am satisfied that a good crop can be secured. I am also satisfied that the farmers in the northern part of Wisconsin will more readily take to beet culture, because they are much more in need of a good-paying crop than the farmers in the southern part of the State.

STATISTICS OF THE BEET-SUGAR INDUSTRY IN THE UNITED STATES FOR 1904.

The following tables give the general factory and farm results for 1904: (1) A table giving the total and average results by States; (2) a table giving the results by individual factories.

The statistics are presented in such a way as not to reveal the identity of the individual factories. The data in these tables were furnished me directly by the factories except in five instances, in which cases I have inserted careful estimates based on reliable information.

General factory and farm results for 1904, by States.

State.	Area harvested.	Average yield of beets per acre.	Beets worked.	Sugar manufactured.		Average sugar in beets.	Average purity coefficient of beets.	Average length of campaign.	Estimated average extraction of sugar.
				Pounds.	Tons.[a]				
	Acres.	Tons.[a]	Tons.[a]			Per ct.	Per ct.	Days.	Per ct.
California	32,801	12.01	395,452	93,311,900	46,655.95	15.74	81.13	79.8	12.5
Colorado	44,466	12.82	550,850	124,557,800	62,278.9	15.64	82.46	87.1	11.1
Idaho	7,700	9.81	75,000	17,596,000	8,798	14.88	86.52	48.3	12
Michigan	53,777	8.06	433,425	103,864,520	51,932.26	15.13	85.47	46.8	11.7
Nebraska	13,100	9.41	123,250	29,374,000	14,687	15.08	81.48	91	11.6
Utah	20,050	12.12	243,000	56,720,600	28,360.3	14.77	82.96	106.7	11.8
Wisconsin	9,500	11.37	108,000	23,600,000	11,800	14.54	83.51	88.6	10.9
Minnesota, New York, Ohio, Oregon, Washington	16,400	8.69	142,500	35,206,000	17,603	15.65	84.77	80	12.2
Total and average	197,794	10.47	2,071,526	484,226,820	242,113.41	15.32	83.09	78	11.74

[a] Tons of 2,000 pounds.

General factory and farm results, by individual factories, for 1904.

Number of factory.	Average yield of beets per acre.	Price of beets per ton.	Average sugar in beets.	Average purity coefficient of beets.	Length of campaign.	Estimated average extraction of sugar.
	Tons.[a]		*Per cent.*		*Days.*	*Per cent.*
1	12	$5.00	18	79	82	11.5
2	8.6	4.90	17.8	82	44	13
3[b]						
4[b]						
5[b]						
6	13.1	4.75	16.5	81.3	80	[illegible]
7	11.6	4.75	16	82.25	77	[illegible]
8	12	5.00	14.8	81	125	[illegible]
9	11.7	5.00	15.7	82.6	130	[illegible]
10	12.9	5.00	14.5	82	130	[illegible]
11	11.03	5.00	16.3	83	110	[illegible]
12	11.6	5.00	15.8	82.6	81	[illegible]
13	12.5	5.00	16	82.5	75	[illegible]
14	10.42	5.00	15	83	91	[illegible]
15	9.11	5.00	15.1	82.4	45	[illegible]
16	13.75	5.00	15	82	81	[illegible]
17	12.19	5.00	15.2	82.8	72	[illegible]
18	10.67	[c]4.50	14.65	83	59	[illegible]
19	10	[c]4.50	14.5	82	62	[illegible]
20	7.94	[c]4.50	16.2	80.6	25	[illegible]
21	8	[c]4.50	13.6	80	47	[illegible]
22[b]						
23	8.1	[c]4.50	14.9	80.25	30	10
24	7.88	[c]4.50	15	84	39	10.5
25	9	[c]4.50	14.5	84.10	90	12.1
26	9	[c]4.50	16	84	77	11
27	8.00	[c]4.50	14.6	80	25	10.6
28	7.65	[c]4.50	15.60	85	91	11.9
29	7.88	4.75	14.87	86	60	10
30[b]						
31[b]						
32	7.65	[c]4.50	13.20	84	59	11.5
33	7.02	[c]4.50	16.7	85	35	13
34	8.56	[c]4.50	15.5	86	60	13
35	9.46	[c]4.50	16	80	91	11.8
36	6	4.75	16.13	86.8	29	11.8
37	4.93	[c]4.50	15.4	84	11	11.9
38	7.29	[c]4.50	15.6	87.6	48	11.7
39	8.82	[c]4.50	14.5	85	50	10
40	12.82	4.75	15.6	86	96	11.6
41	10.72	[c]4.50	15.2	85	90	10.5
42	8.4	[c]4.50	14.7	80	67	11
43	9	5.00	15.17	82.65	116	11.8
44	9.28	5.00	15	85	75	12.3
45	9	[c]4.50	16	84	102	12.1
46	8.4	[c]4.50	15.3	86.5	64	11.5
47	12.16	[c]4.50	14	81.5	119	12
48	13	[c]4.50	14.8	80.1	148	12
49	11.75	[c]4.50	15	84	101	11.6
50	10.71	[c]4.50	16	83	59	13
51	8.88	5.25	15	85	60	12
52	11.78	4.75	14.7	83	105	10.9
53	12	[c]4.50	14	84	175	11
54	9.5	4.75	15.1	84	45	10.9
Average	10.47	....	15.33	83.00	79	11.78

[a] Tons of 2,000 pounds.

[b] Not operated in 1904.

[c] Price paid for beets reaching a minimum standard of sugar content and purity. For each additional per cent of sugar an additional amount per ton (in some cases 25 cents, in others 33⅓ cents) is allowed.

JUVENILE COURT WORK IN COLORADO.

Throughout my report I have often referred to the availability for work in the beet field of the unemployed in our cities and towns, and I have laid special stress on the employment of children for this work during school vacations.

Several of the States have established juvenile courts with special jurisdiction over minors and their infractions of law. The functions of these courts are broad, the general idea being to reform and help youthful offenders. The coldness and rigidity of ordinary penal administration is largely eliminated. It is recognized that idleness is the main cause of youthful crime and at the same time the principal factor in developing mature hardened criminals. Young people must be kept busy, both in self-improvement and self-sustenance. Employment is the antidote to idleness and crime.

Probably in no place in the country has juvenile court work advanced so rapidly and thoroughly as in Denver, Colo. This is due largely to the enthusiastic and systematic work of its instigator, Judge Ben B. Lindsey, of that place.

For employment of the young people coming under its jurisdiction the court naturally turns to the beet fields of the State. This work is especially adapted to young people from nine to seventeen years of age. It may be said that youths of this age in the beet fields are of more service than adults in doing the weeding, thinning, and similar hand work. They are more nimble, and therefore more useful. This work comes at a time when public schools are closed.

In beet growing up to the present, the Denver court has confined its attention largely to boys. Squads of about 20 are sent out to the beet fields under the direction of a "probation" officer of the court, who makes the contract with the farmers and all arrangements for the maintenance of the camp, lays down the rules governing deportment and executes the same, collects the money for the boys' labor, keeps the accounts, pays the bills, and distributes the earnings. Usually contracts are made with the farmers at so much per acre. Since a boy can accomplish as much as an ordinary adult laborer, he receives as much.

There is no other kind of work so specially adapted to the needs of the juvenile court, and it is developing a great resource of labor for beet fields. Our large cities contain many young people to whom this sort of work is well suited, and the opportunity to do it is a boon, not only to the wards of the juvenile court, but many others for whom employment is just as necessary.

Plate IV (figs. 1 and 2) graphically portrays the character of the work developing in Colorado under the administration of the juvenile court. The court is ably assisted by the Juvenile Improvement Association, description of which I clip from the court's pamphlet, "Th problem of the children, and how the State cares for them," as follow

As an auxiliary to the work of the juvenile court, a number of our best citi have formed the Juvenile Improvement Association, of Denver. The purpos this organization is to encourage social betterment for children. The plan was p posed about a year ago and has met with much favor.

In response to my communication asking for plans and details conducting this work, Judge Lindsey writes as follows:

In the first place I deeply appreciate the interest you show in this matter and spirit of your letter. I have not received the report you speak of, but shall forward to its receipt with a great deal of interest.

A gentleman from the northern beet fields was in to see us to-day, and he decl that if proper arrangements can be devised 500 Denver boys can be kept at w most of the time between June and September by his company alone.

Briefly, our plan was to send fifteen or twenty boys in company with a prob officer and a cook with a complete camp outfit. The camp was pitched in differ fields from time to time. In this way the probation officer looked after the b and saw that they did their work and at the same time had a good time. Suppo ing a teacher in a school should go out of the room and leave the best average b of the best families, how much would she get out of them? It is the same way w these boys in the fields. If you have some one with them, just as a teacher in school, you will get good work out of them. We started last spring by having boys come to my court once every two or three weeks, when we would talk to th upon the importance of the work, explain the beet-sugar industry and the respon bility that rested upon them to do their work well. In this way we endeavored get the most responsible juvenile labor. The results accomplished were most sati factory, and a number of families left the slums of Denver and became residents the beet-field districts, because it was brought to their attention in this way throug their boys working in the fields. The first year we attempted this work it wa without organization. The boys were simply sent alone and very few of them di well. In fact, it was declared a failure by the farmers. The last year we had fai success with, I should say, one-half of the boys sent out.

I send you, under separate cover, a little booklet called "The Problem of th Children," and on pages 129 to 132, inclusive, you will find a statement regardin this work.

I wish to thank you for your interest in this matter, as I believe it contains th germ of a wonderful work which can be done by the city and the country cooperatin together for the help of our city boys. Of course it is going to require time and ca to perfect a plan that is satisfactory, but that it can be perfected I have absolutely no doubt.

Descriptive of the purposes, methods, and results in the beet fields, I clip from the court's pamphlet, referred to above, the following:

WORK IN THE BEET FIELDS.

Among the things which the society proposes is to take advantage of the opportunity in the northern and southern sugar-beet fields to supply city boys with work during the summer. Average boys will not work in school unless the teacher is present. Neither are they likely to work in the fields unless some capable person is there to encourage and direct them. It is not surprising, therefore, that boys heretofore sent to the beet-fields without organization or discipline did not give general satisfaction. It is now proposed to send a probation officer in charge of each 20

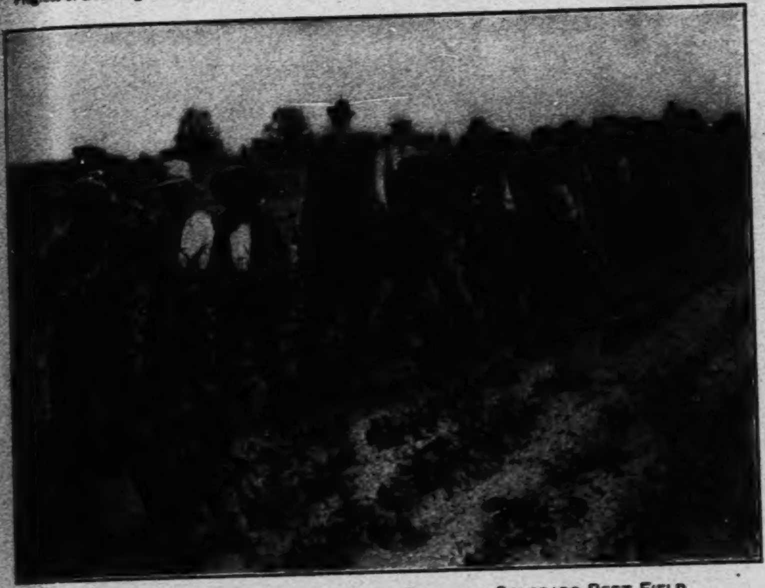

FIG. 1.—A SQUAD OF JUVENILE COURT BOYS IN A COLORADO BEET FIELD.

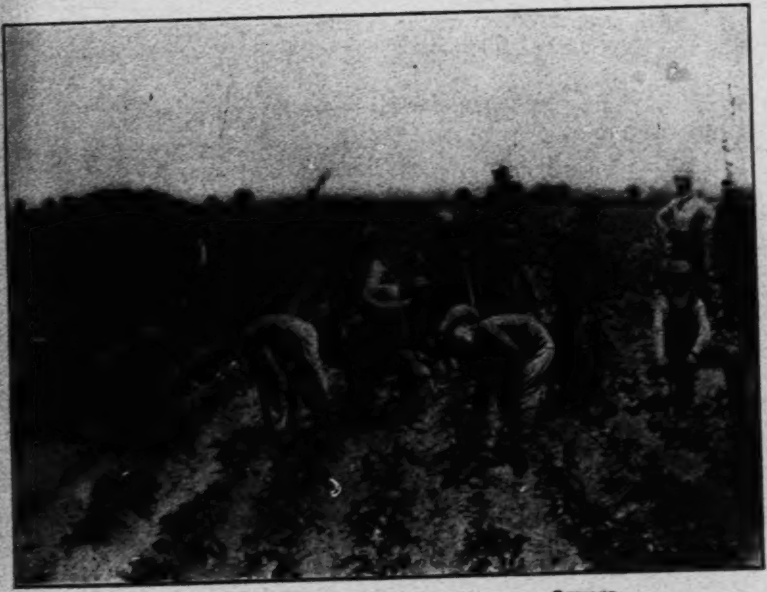

FIG. 2.—THE SAME BOYS AT WORK UNDER AN OFFICER.

boys, with a complete camp outfit, which is to be pitched in the most favorable place near the fields. A number of such camps have been organized and at the present writing are being sent to the fields, with every prospect of success. These boys have been meeting faithfully with the judge and probation officers in the juvenile court upon designated evenings, when their work and its importance—not only to the farmer, but to themselves, to the court, and to the improvement association—is freely discussed. The boys are thus made to feel their responsibility, and, while we can not tell what success may be had or what we can do until we try, we are looking forward with much interest to the result of this plan. Last year something over 100 boys were sent to the beet fields from Denver. They were allowed to do very much as they pleased, and with the same results as would happen in any well-regulated school of the best boys. Less than one-half of them gave satisfaction. Yet something over 20 families went from the slums to the beet fields because of the experiment, and notwithstanding its disappointments, we account it to have been more than worth while.

The court is under great obligations to Mrs. J. J. Brown and her able assistants, Mrs. Margaret Fealy, Mrs. Alexander Helme, and the young ladies who assisted them in the entertainment given at the Broadway Theater in April, 1904, for raising funds for this association and the promotion of the beet-sugar work. The beet-sugar industry in Colorado is assuming enormous proportions and demands a class of work in the fields for three months in the summer—June to September, vacation months—which can be well performed by boys under proper discipline. We are simply trying to avail ourselves of these opportunities for the good of the boys.

GROWING SUGAR BEETS.

In my last annual report (for 1903) I included a carefully revised description of the most approved methods of growing sugar beets. As the edition of that report is now practically exhausted, I have decided to insert here the matter referred to for the benefit of farmers who are taking up sugar-beet growing for the first time.

SELECTION OF THE SOIL.

The first requisite in successful sugar-beet growing is a suitable soil. This will become more evident to the farmer as he proceeds with the crop. There is no doubt that the beet crop makes a heavy draft upon the soil, and should be classed in this respect with corn, potatoes, and tobacco. It quite often happens that the farmer selects a piece of ground for growing sugar beets not well adapted to growing other crops, and not considered productive. If a soil is light and sandy it should be avoided for the beet crop, unless, through rotation of crops and fertilization, it has been brought up to the right condition for sustaining such crops as corn and potatoes.

I am often asked the question, "Do sugar beets exhaust the soil?" The proper answer to this question is that any crop will exhaust the soil if planted continuously and nothing is done to renew it. Sugar beets will not exhaust the soil more than other heavy crops if the right methods are pursued. It should be the aim of every farmer growing sugar beets to make a profit out of them, the same as any other crop; therefore he should be careful in the selection of land for growing them. If a piece of land is not adapted to general cropping, avoid it for sugar beets. Put upon it something better adapted to it, and operate, if possible, in such a way as to make it productive. If it is wet and sour, drain it. If light, put it in grass or build it up with legumes in rotation with light crops and liberal applications of barnyard manure. At least do not try to reclaim it with sugar beets. They are not a good reclaimer.

Beets are an expensive crop at the best and should be put upon lands offering the best opportunities for good yields. It takes 6 to 7 tons of sugar beets per acre to pay the actual cost of production, and it is the tonnage of beets over and above the amount that yields the profit. So it can readily be seen that poor land should be planted to something whose production is not so expensive. On poor land sugar beets are liable to produce a loss, either through low sugar content and purity or small tonnage of beets per acre.

A prospective sugar-beet farmer has a great many facilities at the present time for posting himself in this respect. Sugar-beet growing is becoming quite general throughout the various parts of the United States, and it is quite probable that he can find some one in his neighborhood who has practical knowledge of the subject. If not, the factories are constantly publishing literature containing directions for growing beets, selection of the land, and treatment after the beets are planted. The experiment stations of the various States are publishing bulletins and distributing them free of charge, containing much matter upon these subjects. Every factory has an agriculturist for the express purpose of instructing the farmers in the proper methods of growing sugar beets, the selection of lands, and how to treat the different lands in growing this crop. The Department of Agriculture is publishing a great deal of material upon the subject of the beet-sugar industry. All of these publications are available and free for the information of the farmer engaged in sugar-beet growing.

Most farms contain different kinds of soil, which are in different states of availability for cropping, though some of them are equally good in all parts. The land selected for sugar beets must be fertile and susceptible to fine pulverization. The surface and subsoils must be of such a nature as to be easily penetrated by the tap-roots, laterals, and rootlets.

The land should be as free as possible from the seeds of weeds and grass. However, these can be overcome by sufficient attention and labor.

PREPARING THE LAND FOR THE SEED.

Preparing the soil properly for growing sugar beets is another important feature and comes next to the selection of the soil itself. We must consider all the different important steps necessary in growing a beet crop. A failure in any one of them or a lax or loose method may result in disaster or loss. Having determined to grow the crop, no pains should be spared in doing it right. Everything depends upon doing each part thoroughly and faithfully. The preparation of the seed bed proceeds differently under different conditions of soil and climate.

There are two things, however, that apply generally: (1) Deep plowing and (2) minute pulverization by surface harrowing. Often it is necessary to subsoil while turning the land with a stirring plow. I have seen many instances where this has not appeared beneficial, many instances where it has appeared to be actually harmful, and many more where it has been absolutely necessary. Where winter freezing obtains, fall plowing is usually preferable, if possible. In the first place it catches the summer and fall crop of weeds and grass and turns them under, thus eliminating some of the difficulties of cultivation during the growing of the plants. In the next place fall rains or irrigation dampen the soil, and the upheaval through freezing mellows it and makes available certain of its elements of fertility.

After the land is plowed it should be thoroughly pulverized. This may be accomplished in several ways—by harrowing, dragging, planking, and rolling. Whatever local system is used most successfully in accomplishing this purpose is the most desirable. The idea is to pulverize the soil, and this is an important matter. The sugar beet is, in its early stages, a tender plant, and, while the soil should be fine, at the same time it should be moist and in such a condition as to be thoroughly compact about the beet ball, filling in the convolutions of its outer parts. This is desirable because it enables the ball to absorb moisture, which promotes the germination of the seed. If the surface is left in a lumpy or cloddy condition, many of the balls remain in open spaces, allowing free circulation of the air, and, instead of being moistened, they are dried up and the germs are killed.

Sugar-beet growing is garden culture on a large scale. It might be stated in a general way that, in preparing seed beds for such a crop, and in the care necessary to germinate the seeds and sustain the plants in their after growth, whatever is applicable in gardening will apply also to sugar beets. Most of the success of this plant during its growing season will depend upon the proper condition of the ground at the time of planting.

PLANTING AND GERMINATION.

The soil being in just the right condition and containing sufficient moisture to germinate the plant, the seed should be sown with a beet seeder in rows which are 16 to 20 inches apart, the distance depending on local circumstances and kinds of soil. It is better to use a specially designed beet seeder which is adjustable as regards width of rows and the amount of seed used per acre. The amount of seed usually required is 15 to 20 pounds per acre. The seeds are sown quite thick, the regulation of the amount per acre being governed by the proximity of the seeds in the row.

It is usually anticipated that many more seeds will germinate and come up than are required. This is the insurance part of the performance. A stand of beets is absolutely essential to the success of the crop. The beet seeder can be adjusted so as to plant seeds from a half inch to an inch and a half in depth, according to the kind of soil and its condition as regards moisture, warmth, etc. Care should be taken not to plant too deep. Until experience shall have given him a definite idea of his own, the grower should seek advice regarding the proper depth from some person better posted than himself as to planting sugar beets in his locality.

Some method of compacting the soil around the seed is generally desirable. This is usually accomplished by rolling. The smooth surface left by a roller is objectionable in some localities, for instance, where the soil is sandy and there is much wind, thus drifting the sand against the young beets, cutting them off or injuring them. Under such circumstances the ground is usually "planked." This is accomplished by drawing a platform arrangement made of planks over the soil, which leaves the surface considerably rougher than does the roller.

Care must be used to plant at the right time, the same as with any other crop. This must be determined by the moisture in the soil, its temperature, and the weather.

In from seven to ten days, if the soil is warm and moist enough, the beets will begin to make their appearance. The real struggle on the part of the grower for a crop begins at this juncture. There are several kinds of emergencies that may arise at this tender stage of the plant; a frost or a hailstorm can do them considerable damage, and they may have to be replanted. In replanting, it is not good practice to undertake to reset beets extensively.

This germinating period is the anxious time of the beet grower; a beating rain may crust the surface to such an extent that the beets can not penetrate it. In such cases I have seen valuable results produced by using a harrow to break up the crust of the surface. At every stage of the crop the beets must be kept clean and cultivation must begin at the earliest possible moment. Sometimes they are cultivated soon after planting. These first cultivations are accomplished with special beet cultivators, which work several rows at a time. These cultivators are adjustable to the width of the rows, and usually have, for the first cultivation, small, loose, sharp knives running parallel with the surface and designed to cut off the grass and weeds just below the surface.

BUNCHING AND THINNING.

About the time when the beets show the fourth leaf the bunching and thinning process begins. This is necessary to remove the excess of plants, made necessary in order to secure a stand of beets. Single plants should be left in the row from 6 to 10 inches apart, depending on the distance between the rows and the kind of soil. The time of thinning is important. If the proper amount of seed has been used there will be a considerable excess of plants, due to the nearness of the seeds to one another. A still further excess results from the fact that each particular seed ball contains from one to seven germs, all of which are liable to germinate.

It is quite evident that if all the germs grow, we are liable to have a bunch of several plants from a single seed ball standing very close together, often intertwining and forming a network of rootlets. The longer these plants are allowed to grow in this way the more complex, difficult, and harmful becomes the process of removing the superfluous plants. If this thinning is put off too long it disturbs the position of the plants which are to remain, breaks their tender rootlets, and materially and permanently injures them. Every effort should be made to accomplish this thinning as quickly as possible. A little money spent at this stage proves a very valuable investment in the after stages of the plant. A beet grower should prepare himself beforehand and be ready to accomplish this work and not allow it to drag along. With the best of intentions and preparations, he is liable to be more or less hampered by rains and other difficulties, but he should not fail to exert his best efforts to get his crop thinned as soon as possible after sufficiently matured for this purpose.

The process is known in the common parlance of the grower as "blocking and thinning." Blocking is accomplished by a person walking along the row with a short-handled hoe, sharp and of sufficient width, cutting out part of the beets so as to leave bunches the proper distance apart for the plants in the row. Thinning is accomplished by a person creeping along on his hands and knees and, with deft movements of the hands and fingers, removing all the plants in the bunch except the one his eye selects as the strongest plant. This all requires agility, attention, and industrious and laborious effort; it is in a sense a kind of cultivation, because all the soil is loosened around the plant, and should be compressed around it again with the hand before going on. Grass or weeds growing around the plants should also be removed.

CULTIVATION.

The methods of cultivation are various. The object sought is the elimination of the grass and weeds, the conservation of moisture, and the loosening of the soil around the plant. Beets must be kept clean. By this term in sugar-beet growing is meant more than in corn growing. It is desired that these beets shall be rich in sugar. The sun and air are the great reagents which accomplish this result in the beets. Weeds and grass must be eliminated from the crop in order that this may be accomplished. Beets are a vigorous crop, and they should have the full sustaining power of the soil and not divide it with waste plants and weeds.

After the first cultivation the horizontal blades of the cultivator are replaced with elliptical blades which penetrate the soil 3 to 4 inches and loosen it, making a dust mulch which conserves the moisture of the soil and promotes the growth of the plant. The cultivator is usually drawn by a single horse or mule, and is manipulated by a single laborer, who usually cultivates two or four rows at a time.

It can be seen that this part of the work is not particularly laborious. One man and one horse can cultivate many acres of beets in the course of the season. The number of cultivations given to a crop varies according to the exigencies of the case.

If it is a dry season cultivation should be continuous in order to maintain a dust mulch and conserve the moisture. If the beets are excessively weedy, hand hoes should be used. The number of times beets should be hoed also varies. The crop should be kept absolutely free of weeds; the ground should be kept soft and in good condition. If the land has become foul, the more hoeing the better the results. If the land is fairly clean but little hoeing will be necessary.

It has never been my privilege to visit Germany or other beet-producing countries, but I have been very much interested in interviewing well-informed agriculturists of our own country who have inspected the methods used in the beet fields of Germany, France, and other European countries and compared them with those prevalent here. It seems that there is a wide difference between methods of beet culture employed there and those employed in this country, and the difference is not in our favor. In Germany a plan is outlined for rotation, which involves the manipulation of the land for a series of years. This land is handled in such a way as to bring about the best results during the different years in the cycle of rotation and for the different cycles planned. There cultivation and preparation of beet fields are more like careful gardening. I grant that this involves some expense. The increased yield, however, and the economy of soil manipulation, induced by its better mechanical condition, very much overbalance the expense.

The cultivation of a beet crop should begin the moment the soil is broken up for planting to beets. If the land is broken in the fall it should be harrowed immediately, possibly rolled. It should be allowed to rest for a while, giving the weed seed time to germinate and come up, then it should be cultivated and harrowed again. In the spring after stirring it should be cultivated and harrowed several times until ready for planting. After planting it should be gone over with a "weeder" or harrow as soon as the weeds and grass begin to appear. These harrowings, etc., kill weeds, conserve moisture, and prevent the soil from baking. A cultivator should be brought into requisition at the earliest possible moment and the services of the "weeder" or harrow continued alternately with the cultivator even after the plants are up. Cultivation should be continuous from the moment the beets come in sight until they become so large that it is impossible to continue.

Good results are just as effective in teaching a farmer as in any other business. When doing things a certain way results in large profits, the farmer is disposed to repeat the operation. In order to procure a good crop of corn, potatoes, or any other cultivated field crop, it is not really necessary that the fields should be absolutely clean. They may be well cultivated and kept ordinarily clean during the growing season, and still a good yield may be secured. But yield is not the only thing under consideration with sugar beets; they must be pure, and high in sugar, and clean cultivation is vitally necessary in securing this end.

These other crops, although producing good yields, offer opportunities for the ripening of considerable weed and grass seed to trouble the farmer in the cultivation of his succeeding crops. When the growing of sugar beets proceeds in the correct way the ground is left practically free from these weed and grass seeds. When the harvester plows out the beets in the fall it is equivalent to another stirring of the ground. Whatever weed and grass seeds remain are turned under, and either germinate in the fall or come up in the early spring and are caught by the stirring plow or the early cultivator of the succeeding crop. If the crop of corn or potatoes follows in the spring, we have a mellow clean field, and the cultivation is very much facilitated. Just as beneficial effects result from having a clean field if wheat, barley, or oats follows beets. The influence of beet growing upon any other crop for the next two or three years is very decided. By the time this effect begins to diminish the cycle of rotation has run out and we plant beets again, and the crop can now be produced with better results and with less effort than before.

Farmers are not slow to learn the lesson taught by growing sugar beets. A mistake often proves expensive. A valuable fact learned through experience is sure to perpetuate its influence.

I grant that, to the average American farmer, accustomed to growing 160 acres of wheat or small grain, in addition to a large acreage of corn, such an outline of work as this may seem preposterous. I wish to assure any such person that it is the most logical method conceivable. This assertion will be indorsed by many successful beet growers of this country who are accustomed to beet growing in this or a similar manner. The logic of this method is that the yield and superior quality of the beets will pay all this expense and greatly enhance the profits besides. It must be within the experience of every observing farmer that a good stand of any crop is the first requisite of profit at the harvest. Such a stand depends largely upon a proper preparation of the seed bed. It must be just as patent to him that cultivation with a harrow and cultivator is a great deal cheaper than cultivation with the hoe or by any hand method. It is much easier and cheaper to destroy weeds when they first germinate or while they are young than it is after they have become well established in the soil. It is less expensive to cultivate in the manner above described than in the one ordinarily used, which involves hoeing and hand weeding.

To the person accustomed to his 160 acres this method of cultivation may seem impossible, but I contend that he should not plant 160 acres in sugar beets unless he has a large capital and plenty of labor at hand. For an ordinary farmer 10 acres is considerable. For an extensive farmer 25 acres is a large tract of beets. There are farmers who can successfully grow much more. The acreage should be such that it can be gone over many times with the rollers, cultivators, and harrows. If proper attention is given at the right time and is continuous, weeds can be kept in subjection with very little use of the hoe or hand work. Cultivation of other crops should teach this. Good judgment and carefully matured plans for the accomplishment of these things in the right way at the proper time is of vital importance. When such judgment and such planning are contributed beet growing resolves itself into a task of comparatively easy execution. If the farmer will use these methods and thin his beets at the proper time before they have become too large there can be no question of a good yield. Good judgment is also required in selecting the proper time for planting, when the soil is moist enough and warm enough to thoroughly germinate the seed.

Information and advice on all of these points can be obtained from the agricultural superintendents of the sugar factories. The farmer should not follow his own judgment and then hold the sugar factory responsible for poor results afterwards. His own judgment will be a good guide for him after he has had considerable experience in growing the beets, the same as with other crops. It will then be worth as much to him as anybody else's judgment, if not more, because he will understand better the action of his soil with beets after its manipulation for a series of years. Until such a time arrives he is bound to follow the advice of those especially provided by the factory for that purpose. In fact, as a rule, he should always secure the benefit of the advice and judgment of these factory experts.

When the leaves of the beets touch those of the adjoining rows their shade becomes so dense that the ground ceases to dry out so quickly and the weeds and grasses are overcome and smothered in the race for existence. Too much insistence can not be made on horse cultivation. Often growers stop cultivation at the critical time for its use, claiming the soil is too dry for cultivation. This is the time when it is most necessary. In fact cultivation should be constant. Killing weeds is not the only object; conservation of moisture is paramount when the season is dry. Cultivators stir the surface much deeper and more regularly than hoeing.

Constant cultivation maintains a dust mulch and breaks up and covers the sources of the moisture, thus holding it in the soil for the plants. Hand hoeing in its place is desirable, but my observations have convinced me that in practice in this country it is unwise and tends to a high cost of production. A proper system of horse cultivation will lead to better results and at a lower cost. No hand hoeing can ever take the place of the cultivator in conserving moisture. I believe that a proper system of cultivation would greatly cheapen the cost of production of beets and greatly increase the tonnage per acre. In fact, I have seen this demonstrated so often on the farms of our successful growers that I am convinced that to unwise and expensive cultivation is due most of the discouragement in sugar-beet growing wherever it exists. I can state it as a general rule that our best yields are not accomplished with the highest cost of production. It is common to see yields averaging 15 to 18 tons per acre in fields alongside of which are others yielding only 5 or 6 tons, the beets being grown from the same seed on the same land, but operated by a different farmer.

HARVESTING.

After the crops have matured the next work of the grower is the harvesting. The time of harvest is usually indicated by the agriculturists of the sugar factory for which the beets are destined, and notice is given to the grower to deliver his beets to the factory. An expert in sugar-beet growing can readily discern when beets are ripe. The leaves droop and take on a yellow cast. The sooner they are harvested after this the better, as they have reached their maximum of sugar content and purity. Warm fall rains are liable to start a new growth of the beets, causing them to send out a fresh supply of rootlets. This has a tendency to lower the purity and sugar content of the beets. If it is apparent that the crop can not be received at the factory at some time in the near future, the beets should be harvested and siloed. The contract usually provides for following the orders of the factory in this respect, and this is the safest course.

Siloing is performed by taking the beets after they are harvested and placing them in piles, covering them with dirt to prevent evaporation and freezing, and increasing the dirt covering as the weather grows colder. There are many methods of siloing in use. The usual one consists of piling the beets in long ricks, pyramidal in shape, with a base of about 6 feet and a height of about 4½ feet. If straw, beet leaves, old hay, or anything of the kind is used, it should be placed on the rick after the dirt. If it is placed on the beets before the dirt, it is liable, by the pressure of the dirt, to adhere to the beets. When they reach the factory this litter interferes with the further manipulation of the beets; it clogs the ditches, and some of it still adheres to the beets after they are washed and interferes with the slicing. For several reasons it is undesirable to place straw, beet leaves, or the like on the beets first.

There are many kinds of harvesters in use. A very common kind is a long-shanked plow, similar to a stirring plow, with a long, slender share which cuts off the beets about 9 or 10 inches below the surface, and the moldboard throws them over on their side, after which they are picked up. Another very common variety of harvester is an implement in the shape of a plow. Instead of a moldboard it has two shanks, each terminating with a prong like a finger. These are forced through the soil, one on each side of the row of beets, at a depth of about 9 to 10 inches. The opening between the two fingers gradually lessens as the beets pass through the space between them until finally the taproots are broken and the beets are lifted 2 or 3 inches from their position in the soil, whence they are easily extracted by a person following the plow.

Topping is a feature of harvesting which consists in removing the crown and leaves of the beet by a single stroke of a knife in the hands of the operator. It is the purpose of this operator to cleave the beet at the sun line, indicated by the discoloring of that part of the beet just above the surface of the soil. After the beets are topped they are thrown into piles or in wagons or are sacked, preparatory to their delivery to the factory.

The delivery of the beets is accomplished in several ways. Anywhere within a radius of 10 miles from the factory they can be delivered in wagons. A greater distance than this usually necessitates delivery by railroads. There are different methods of unloading the beets, some special method of dumping being usually employed. This is accomplished in some places by dumps at the factory, on which the wagons are driven and attached, and, the horses being detached, the whole load of beets is then dumped into the bins automatically. At other times the wagons are prepared with nets lining the boxes. These are taken up by movable derricks or cranes and swung over the bins, where the nets open and the beets are dropped into the bins. In other places the beets are shoveled out of the wagons in the old-fashioned way with potato shovels or beet shovels.

At other places, where the beet-sugar acreage is grown in different localities, at a distance from the factory, special dumps are built near a sidetrack of a railroad at some point in each locality convenient for the surrounding farming district. Such a dump is elevated and approached by a long incline or tramway, at the lower end of which the beets are weighed and up which the load is driven onto the dumping platform. The horses are detached, and by means of the dump the whole load is precipitated into a car on the sidetrack below. These are very convenient contrivances, and are becoming quite popular in a great many places. They offer convenience in the delivery of beets by the farmer, greatly lessening the cost of delivery and very much extending the beet-growing area of the factory.

CROP ROTATION AND GREEN MANURING.

A system of crop rotation should be adopted. The best rotation, as a rule, is the one which permits of fall plowing prior to the season of planting beets. This is especially true in sections of the country where the soil is subject to freezing. The proper rotation, however, depends entirely upon the location of the farm and the kinds of crops generally produced in that section.

I have seen sugar beets grown successfully and successively for a series of years, sometimes as high as five, but it goes without saying that this is not the proper method. Usually the results of such farming are bad. It should be the aim of the farmer to thoroughly fertilize the ground during the cycle of rotation. This is usually considered most favorable for beets if done a year or two prior to planting of the crop. Always start with the best land, and bring other lands up to a better state through rotation, cultivation, and fertilization before planting to beets. In this way beets eventually increase the productiveness of the whole farm.

I do not advise that the farmer should abandon other crops to grow beets; in fact, under a proper theory of farming, such a thing would be impossible. I do advocate, however, that a farmer should grow beets for two purposes. First, to improve his farm for other crops, and second, for the good profit in producing them. This simply involves the introduction of beets in rotation with other crops. Every farmer should have a plan for the manipulation of his farm for several years in advance. He should balance his stock interests with his crop returns. He is accustomed to growing certain staple crops adapted to his locality. He has done so for some time. He will continue to do so in the future. But there is no reason why he should not broaden his plan, if he has an opportunity to introduce a new crop which will increase his profits and his land. If a sugar factory is located in his vicinity, sugar beets should be introduced into the crop rotation. Probably the main crops have been hay, small grain, corn, etc. In a proper rotation with beets, these follow each other in a logical manure from field to field. If the farmer has properly balanced stock raising against his crop production, he will be able to retire from the business of selling grain to that of feeding his stock for beef, pork, poultry, butter, cheese, and eggs. This enables him to improve his soil with barnyard manure; in addition, it enables him to introduce into the rotation the growing of leguminous plants, the clovers, stock peas, alfalfa, etc. These legumes store in the soils nitrogenous elements required by the grains, and thus serve as a valuable fertilizer. There are places where plowing under of this green crop is not practicable, but it is very desirable in most of the States where beets are grown under rain conditions and where the lands receive considerable freezing in the winter. Such methods as these are within the reach of almost every farmer growing beets and should come more generally into use than at present. The sugar beet should not be the rival of other crops, but should be their ally. We need more careful attention to systematic rotation and fertilization.

OTHER MEANS AND METHODS OF INCREASING SOIL FERTILITY.

Methods of fertilizing the soil for the beet crops are largely on trial in this country. That some fertilization is desirable goes without question, but in practice very little fertilizer is used. It seems necessary, therefore, to emphasize this question here. We have been so accustomed to growing all kinds of crops without fertilizers, reclaiming wild lands and continuing them in cultivation and cropping without any reenforcement, that this question has not come home to us as seriously as it has to the people of older countries. Even if we possess abundant virgin fertility in our best lands it will only be temporary at most; we are simply drawing on the future. The sooner we begin some systematic system of fertilizing the better it will be for the soil.

One of the fixed charges of cropping in the old countries, especially in the sugar-beet districts, is for fertilizers. In Germany sugar beets are grown on land worth from $200 to $800 per acre. In a cycle of rotation it costs to fertilize the land from $12 to $25 per acre. Crop earnings there have to be distributed upon such high values of land and fertilization that the people of this country possess a real advantage in this respect in the growing of sugar beets in competition with the farmers of those old countries. A sugar-beet crop is one that will justify the investment in fertilizer.

The methods and systems of fertilization are so various and so dependent upon the character of the soil that it is hard to outline any particular kind. The requirements of the soil are like those of animals. They can not all be fed alike. There is a lack of some of the elements of plant food in some soils and an overabundance of other elements present in both the available and nonavailable state. Fertilizers promote plant life directly, and some indirectly, by breaking up compounds and freeing elements of plant nutrition which enter into other available compounds.

It is a truism to say that soils need a balancing by artificially supplying those elements of fertility which are lacking. This is especially true of the silt soils of the mountain States and the Pacific coast. The deficiency is best supplied by the introduction of commercial fertilizers. Many of our soils are lacking in humus; they may be rich in mineral plant foods, while at the same time they are poor in mechanical structure. Such soils need to be reenforced by the compost heap and by decaying vegetable matter. Without humus they dry out and become hard and sterile. Moisture is the agent of solution and circulation, the solvent and common carrier of plant food.

Many soils are deficient in nitrogen, which is supplied both through commercial fertilizer and decaying vegetable and animal matter. Barnyard manure offers a ready means for fertilizing the soil, and one which every farmer can employ. Much has been said and written upon this subject, and with a common accord favorable to its use. There has been considerable difference of opinion, however, as to the time and methods of its application for beets. I think much of this disagreement is due to the different requirements of the various soils. Probably barnyard manure is good for all kinds of soil on which sugar beets are grown. As to the time of its application I do not care to make a suggestion, except that the farmer should experiment with his soil, study the action of similar soils, and follow his best judgment. Any farmer can largely increase his supply of barnyard manure by a methodical effort. I wish to call attention to the helpfulness of a sugar factory in this particular. Through the pulp produced by it and beet leaves and beet tops left in the fields the sugar factory makes possible a large increase in the number of animals kept on the farm. These by-products afford abundant stock food and stimulate animal production.

The farmer takes a load of beets to the factory and takes home a load of pulp. He gathers his beet leaves or stores them or mixes them with pulp, in a silo made for that purpose. Both the pulp and the leaves are good for young animals, fattening animals, and dairy cows. The barnyard manure should be carefully preserved and taken back to the land, increasing the humus and supplying nitrogen and other plant foods. The sugar factory has extracted the sugar, which is not a part of the soil's fertility. Assuming that he returns all of the manure resulting from feeding the pulp from his beets, and the beet leaves of the crop, he has returned to the soil again all the fertility appropriated by the beets, except that assimilated by the animals. The farmer has intensified the productiveness of his lands and increased the profits of cropping. Every city or town affords a supply of barnyard manure. The citizens are glad to get rid of it. They will give it away, and sometimes they will pay for its removal. When a farmer takes a ton of beets to the factory he receives only a half ton of pulp in return. He will be able only to bring home half as many tons of pulp as he delivers tons of beets. But he need not return empty-handed; he can return half the time loaded with barnyard manure and distribute it on his farm. In this way he can haul a load from as well as to the factory, thus largely reducing the net cost of delivering the beets.

I have talked with thoughtful, progressive, and successful farmers who claim that a special trip for the average distance the farmers haul beets to the factory, made for the sole purpose of procuring manure from the towns of the vicinity, is highly profitable. If this be true, then in case he can return to the farm with a good load of manure after unloading his beets, it virtually costs him nothing to deliver a load of beets to the factory.

EXPERIMENTS WITH COMMERCIAL FERTILIZERS.

In the older beet-growing countries of Europe, where plans are arranged ahead for the manipulation of farms for a series of years, fertilization is one of the things most carefully considered. We are very little accustomed in the greater part of this country to the use of commercial fertilizers. In fact, we are not as much inclined that way as we should be, or as we will in years to come. I wish to insist, however, that we should not fail to resort to those methods of improving our soil now in use by every good farmer in our country, and known to everyone, whether he uses such methods or not. This is applicable to every crop, but it is especially so to the beets.

The Department of Agriculture has conducted experiments for several years past for the purpose of determining the value of various kinds of fertilizers on sugar beets. Last year, at the suggestion of the Secretary of Agriculture, a number of similar experiments were carried through on a somewhat larger scale than heretofore. In these experiments 10-acre fields of uniform soil were selected and divided into two equal parts. On one part 500 pounds of fertilizer per acre were used, while no fertilof any kind was used on the other. A ton of the fertilizer prepared for these experiments consisted of—

	Pounds.
Superphosphate	1,100
Sulphate of potash	400
Dried blood	500
	2,000

This mixture was used in Michigan, Utah, Colorado, and Washington States as representing to some extent the several sugar-beet sections. In several cases no reports of results were obtained, but the experiments reported upon showed a decided increase in tonnage, due undoubtedly to the action of the fertilizer. In addition to the increased tonnage, the beets on the fertilized soil contained more sugar and a higher coefficient of purity than the beets on the unfertilized soil. In one instance where a sandy loam was used the returns from the 5 acres that were fertilized amounted to $291.32, while the 5 acres that were not fertilized produced but $144.68 worth of beets, a clear gain of over $100 from the use of fertilizers on 5 acres of beets. It is confidently expected that this work will so encourage the growers of sugar beets that they will hereafter be enabled to obtain larger returns for the money and labor invested in sugar-beet production. In some sugar-beet sections the growers have already learned the value of good fertilizers and assert that they would not attempt to grow this crop without the application of plant food to the soil.

EXPERIMENTS WITH BARNYARD MANURE.

As throwing light upon the advisability of manuring a plat of ground used in growing sugar beets the same year they are planted, I offer the results of some very interesting experiments conducted by the State experiment station at Geneva, N. Y. These experiments were conducted for the following purposes: (1) Testing the results on the quality of beets grown on land to which stable manure has been applied in the spring prior to the crop; (2) testing the quality of the beets in comparison with beets grown on land receiving no manure; (3) testing beets grown on land receiving commercial fertilizer, compared with those grown on land receiving stable manure. On the plats receiving the commercial fertilizer, 1,000 pounds per acre was used; on plats receiving barnyard manure 40,000 to 80,000 pounds per acre was used. In either case beets gave better results with barnyard manure.

In growing beets it has been generally believed that it is a bad practice to apply fertilizers, especially barnyard manure, in the spring of the year of cropping. These experiments seem to show the reverse of this proposition.

These experiments, which were carried through four years, included the growing of beets from high-grade seed from various sources, at least six different varieties being used. The main question at issue in this work was the effect of commercial fertilizer and stable manure upon the manufacturing value of the beets, with especial reference to the possibility of depressing the quality of beets by growing them on land to which stable manure has been freshly applied. A determination of the percentages of sugar and of the coefficients of purity has been the means of judging of the quality of the beets grown. If beets may be standardized as to quality by the proportion of sugar in them, together with coefficient of purity, then the conclusions to be drawn from the data herewith presented are plainly indicated, as the table following will show.

General summary of results showing the influence of manure upon the quality of sugar
1898–1901.

Year.	On plats which were not fertilized.		On plats which received commercial fertilizer.		On plats which received stable manure.	
	Sugar in beets.	Coefficient of purity.	Sugar in beets.	Coefficient of purity.	Sugar in beets.	Coefficient of purity.
	Per cent.		*Per cent.*		*Per cent.*	
[illegible]	15.2	85.2	15.0	75.4	17.3	[illegible]
1898	15.6	81.6	15.0	79.4	15.9	[illegible]
1899	14.8	84.2	....	....	15.6	[illegible]
1900	....	....	14.2	82.6	15.2	[illegible]
1901	13.1	82.9	13.9	85.7	13.8	[illegible]

Attention is directed to the figures of the preceding tables, but more especia the general summary in the table just given. The data here presented are striki opposed to what is regarded as the orthodox method of manuring sugar-beet It so happens that, with the exception of the crop of 1901, not only does the manure fail to depress the quality of the beets, but the crops grown where it applied in the spring show a higher percentage of sugar than where commercial tilizer was used or where no manure was applied. In 1901 the percentage of was but little lower, but the coefficient of purity appeared to drop. But in this the stable manure was used in an excessive quantity.